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ARCHIVES OF OTOLOGY.

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CONTRIBUTIONS TO THE PATHOLOGY AND  
PATHOLOGICAL ANATOMY OF THE  
ORGAN OF HEARING.

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*(Continued from page 480 of Vol. vii, of Arch. of Ophthalmology and Otology).*

## B.

THREE CASES OF SECONDARY AFFECTION OF THE TEMPORAL BONE IN CONSEQUENCE OF NEO-PLASMA IN THE POSTERIOR NARES, WITH REMARKS ON SYMPTATOLOGY AND TREATMENT.

The first of the following cases was observed in Friedrich's clinic, the third in Simon's clinic. For the clinical histories I am indebted to the clinical's assistants, Drs. Eisenlohr and Schädel. The third case was seen in common by my colleagues Dr. Erb, Dr. Fischer of Mannheim and myself.

CASE 1.—Joseph Zartmann, 19 years of age, a joiner from Neckarsulm, was brought to the Medical clinic at Heidelberg on December 14, 1873. He stated that since the latter part of November of that year he has had a lancinating pain in the right ear and in the region of the right mastoid, which was accompanied by noises in the ears, and increased in intensity as time went on. On December 7th, a paracentesis was performed on the right *M. T.*, and a small quantity of pus let out. The pain abated; afterward pain, unaccompanied by tinnitus, attacked the left ear.

In the first days of his stay in the hospital, (the treatment was

conducted by Prof. Moos), there was an alternate increase and diminution of the pain in both ears and the head. About the last of December a swelling was observed in region of the right sterno-cleido-mastoideus muscle, which extended from the mastoid process to about 1" below it, to which was added a pharyngitis that caused the patient a good deal of difficulty in swallowing.

On January 1st, a hard tumor, the size of a hazel-nut was noticed behind the angle of the jaw on the right side. Tinnitus and pain continued, especially in the right ear, and were often so severe that morphia had to be given in large doses.

During the first fourteen days of January, the earache again gave way; on the 14th it was noted that *the right half of the palate was not so movable as the left, and that the uvula hung towards the left side*. The pain now extended more over the whole right side of the head and face; frequent epistaxis, (shortly after the commencement of the pharyngitis there occurred a hemorrhage from the mucous membrane of the throat, which came from an erosion of the parts). Opening of the mouth gives pain. The pain in the right ear became again more violent during January.

The teeth on the right side began in time to pain him. The paralysis of the right half of the palate increased.

Since January 26th Politzer's method was used: on January 25th, an examination showed the *M. T. without* perforation.

The left side of the head is not perfectly free, pain sometimes in the left ear, and sometimes on the left side of the head. The patient begins to lose flesh rapidly; the appetite is poor.

An examination of the function of hearing on February 12th showed that on the *right* side the watch is not heard when held immediately before the external meatus, nor when applied to the cranial bones. The watch is heard on the *left* side, even when removed at some distance. An electrical examination shows simply a hyperæsthesia of the acoustic nerve.

Epistaxis more frequent; pain in both ears; the local treatment (catheterization and Politzer) was discontinued.

*New symptoms* were noted on February 19th: the neck was stiff; the sterno-cleido-mast. muscle contracted, lateral movements of the head painful; the tumor before noted in the right sterno-cleido-mast. region below the mast. process has enlarged (swollen lymph gland); other smaller tumors are found near it; the right palate is completely paralysed. Behind the left sterno-cleido-mast. a collection of smaller and sensitive glands.

On account of an exacerbation of pain in right side of the head, ear and teeth, three leeches were applied on the right mastoid region, but with no effect; large doses of morphia were also of no avail; after the application of the leeches the *tinnitus in the right ear was louder and continuous*. The use of the galvanic current had no curative effect on the tinnitus.

At the beginning of March a *tumor* could be seen and felt, which pushed the right half of the soft palate strongly forward, and obstructed the passage through the right nostril. It had taken possession of the niche between the two palatine arches on the right side, and could be followed downward to the level of the epiglottis.

Swallowing became more difficult, as did also speech, which is nasal in character. Great pain in the region supplied by the trigeminus; blepharospasm; later, ptosis on right side, and slight weakening of the right facial.

Hearing power on right side = null; on left side tolerably good. From 3 to 4 times daily morphia injections of 0.015 to 0.02.

On March 12th, œdema of the right side of the face; the tumor has almost completely filled the throat, and has extended itself over towards the left; an increase in the number of swollen lymph-glands on both sides of the neck, which occasion great pain.

On March 16th, pain by pressure on the upper cervical vertebræ, the mouth can only be opened to a limited extent; the nasal passages almost obstructed. *No* marked facial paralysis; an anæsthetic spot in the lower orbital region on the right side.

The tinnitus on the right side continues. The general condition of the patient is becoming worse daily; the distracting pain, frequent hemorrhages from various parts of the tumor, the obstruction to swallowing, all conspire to an increasing emaciation and debility.

On April 10th a shortness of breath set in; expectoration of the bronchial secretion was impossible; the lower posterior portion of the lungs gave a dull sound on percussion. Under increasing cyanosis, gradual loss of consciousness, and slowing respirations, he died on April 11th, at 11 o'clock.

*Clinical diagnosis: Sarcoma basis cranii; otitis media.*

Extract from the record of the Ear-clinic: J. Z., joiner, pre-

sented himself for the first time on December 2, 1873. His ear trouble, for which he could assign no cause, had existed, according to his statement, for four weeks. Since that time he has had an almost continuous headache on the right side, and a lancinating pain in the right ear, with no apparent discharge, together with constant tinnitus and considerable diminution of his usual hearing-power on this side. An examination showed the lower wall of the external meatus to be covered with pus and epithelium. The vessels along the handle of the malleus are hyperæmic, the *M. T.* itself is infiltrated with serum, and has a perforation behind the middle of the malleus-handle the size of a pin-head.

Hearing distance for speech 1 *m.*, for the watch 2 *cm.* Bone conduction lacking for the watch and tuning-fork. No alteration has ever been noticeable in the left ear. The inflammation of the tympanic cavity was treated with instillation of zinc. sulph. 0.2 ad 30.0. In two days the perforation had healed. The subjective sensations and the deep aural pain, however, became more intense. The absence of bone conduction for watch and tuning-fork remained. After the healing of the perforation an effort was made to give the patient relief by means of the air-douche, but neither the catheter nor Politzer's method had any effect.

At no time did the driving of air into the tympanic cavity cause a diminution of the subjective noises, or an increase of the hearing power. On December 7th, there was seen on the lower portion of the very *concave M. T.*, without anywhere any partial protuberance, a yellowish-green discoloration, similar to a hypopyon behind the cornea, on account of which a paracentesis was made. There was no discharge of pus following this, not even after the air-bath; it only came out after a rarefaction of the air in the external meatus. After the discharge of a moderate quantity of pus, the pain abated, but the tinnitus continued. The watch was heard at 6 *cm.*, and whispers close to the ear. After the healing of the paracentesis the pain rapidly returned, but no renewed formation of pus in the tympanic cavity was demonstrated. The treatment instituted after the paracentesis had no effect. Catheterization was painful; each unsuccessful attempt to turn the instrument was followed by a slight hemorrhage, and since the persistent absence of bone conduction for the watch and tuning-fork made the presence of a labyrinth affection certain, and as all treatment of the middle ear seemed to be fruitless, he was transferred in the middle of February to the medical clinic.



*Sectio cadaveris*: made on April 13th, by Prof. Arnold.  
Extract from the record:—

*Anatomical diagnosis*: Retropharyngeal cancer with metastasis in the neighboring lymph-glands, bronchitis, bronchi-ectasia, purulent peri-bronchitis, and broncho-pneumonia, lobular catarrhal pneumonia, dry fibrous pleuritis, alveolar spindle-celled sarcoma.

The relations of the tumor to the neighboring parts were as follows:

After opening the skull the *clivus* of the sphenoid and occipital bones was found to be pushed somewhat forward and soft to the touch. Brain and membranes normal. The lymph-glands on the right side of the throat slightly swollen. On opening the throat there was found on the right side a tumor the size of a plum extending into the base of the skull. The surface of the tumor is smooth, soft and of grayish-red color. The tumor extends in the broken down tissue of the sphenoid and occipital bones backward on the left side as far as the apex of the petrous bone, and forward as far as the sphenoidal cavity. It has completely destroyed the pyramid of the right petrous bone and extends thence to the posterior wall of the superior maxillary bone; outward it reaches to the ascending ramus of the lower maxilla. On the left side of the neck on the large *vessels* a number of very much swollen, soft-looking lymph-glands. On the right side the tumor surrounds the vagus nerve and the sympathetic at the base of the skull. It is in all its parts of an even grayish-red appearance, and soft in consistency. The dura mater is not perforated anywhere. The mucous membrane of the throat is much swollen and congested.

The temporal bone was put in Müller's fluid and then treated with alcohol. The examination was made by me on 22d June, and revealed the following: The tumor had not only destroyed the apex of the petrous bone, but had also completely dislodged the osseous frame-work on one side to a distance of 7 mm. from the *eminentia arcuata*, and on the other side to that part of the roof of the tympanic cavity opposite to the last. After the removal of the somewhat thickened dura mater, which on its inner surface was attached to the surface of the mass, the flat tumor was exposed to view to the breadth of about 2 cm. *The greater part of the Eustachian tube is lost in the tumor-mass.* The osseous roof of

the tympanic cavity is preserved up to a point opposite the tympanic orifice of the Eustachian tube, yet is easily removed with the labyrinth knife. The malleo-incudal articulation is imbedded in the hyperplastic mucous membrane and is immovable. The sagittal diameter of the preserved osseous roof of the drum, situate between the tympanic end of the tumor and the inner margin of the head of the malleus, is about 3 *mm*. This piece of bone is also easily removed. The musc. tens. tymp. is also lost in the tumor mass *i. e.*, destroyed by pressure from the tumor. The hammer rests against the wall of the labyrinth. The handle, when viewed from above, forms with its anterior edge the intratympanic limit of the new formation. When viewed from the external meatus, the *M. T.* appears funnel-shaped without perforation.

The limit of the new growth in the region of the porus acusticus internus corresponds to a line which passes from the angle of the petrous bone at the post. edge of the porus acusticus to the foramen jugulare. The dura mater surrounding the nervus acusticus and the facialis is on its anterior and inferior surfaces intimately united with the tumor, so that in stripping off this part of the dura, portions of the tumor remain adherent to it. The nerves themselves are somewhat flattened, but show an unaltered structure throughout their entire course in the petrous bone.

The microscopic examination of the membranous labyrinth showed no essential alteration aside from a strong vascularization and a great richness in margarine crystals, which disappeared by treatment with alcohol and turpentine. The stapes was in position and its foot-plate (laid bare from the vestibule) was not so easily movable as in the normal condition. A histological examination of the tumor showed the characteristics of an alveolar spindle-celled sarcoma.

Without any doubt, the development of the tumor took place from the right half of the basis cranii. The beginning of its development was in the highest degree obscure, and the complaints of the patient date back to the time when through the extension of the tumor to the right temporal bone, the function of hearing on that side began to be interfered with. It is difficult to judge, whether it was the middle or inner ear that was first affected. But the growth of the tumor upward makes it probable that the

anatomical alterations began in both parts at the same time. It was only at the last that the growth of the tumor was in the direction of the porus acust. int., for otherwise, an examination of the two nerves lying in it would have revealed other alterations than mere flattening. At any rate, it came later than the hyperæmia of the labyrinth and the purulent inflammation of the tympanic mucous membrane. This cannot be considered as an *idiopathic*, but only as an irritative accompaniment, as a *symptom* called forth by a propagation of the irritated condition brought about by the encroachment of the tumor on the Eustachian tube. The constant impermeability of the tube, noticed from the first examination, is but too well demonstrated by the autopsy. The surgeon should, in cases of new growths in the naso pharyngeal space, pay special regard to this symptom, and a constant *impermeability* of the Eustachian tube when clearly demonstrated, is sufficient to stamp the case as a *noli me tangere*, as far as regards operative interference.

CASE II.—To a further elucidation of this question I offer another case, which, though I saw it only once in the ambulatorium, is yet calculated to substantiate the opinions already put forth.

*Left-sided tic douloureux throughout the extent of the left trigeminus. Sarcomatous growth in the left naso pharyngeal space. Rapid growth upward and invasion of the cranial cavity. Left-sided exophthalmus with trigeminus ophthalmia. Permanent impermeability of the left tube. Death from exhaustion, in a condition of stupor.*

Conrad Remmele, hitherto under the treatment of Dr. Emil Fischer in Mannheim, came to my clinic for the first time on May 25, 1875. The patient is 45 years old, and a railway-carriage porter. He has suffered since July, 1874, with an increasing impairment of hearing on the left side, without discharge, and at the commencement without pain. The latter set in in January, 1875, at the same time with a severe pain in the left half of the face. It has kept pace with this facial pain, which, in spite of all therapeutic measures, still persists.

*Status præsens*: Left external meatus free, *M. T.* very concave, mucous surface hyperæmic. Lower anterior portion of the *M. T.*

of increased brightness. Short process prominent, handle drawn in. *The Eustachian tube impervious by both methods*, even after an incision into the *M. T.*, which healed rapidly. Catheterization not painful. Hearing distance for speech  $\frac{1}{2}$  m., for the watch contact, bone-conduction for the watch and various tuning-forks present. Between the mastoid process and the lower maxilla on the left side, a tolerably large, elastic, smooth tumor, with a pale surface, and painful only when pushed toward the deeper portions of the neck. It has no connection with the left parotid. The opening of the mouth is restricted, but painless. The left palatine arch and the left tonsil are pushed toward the median line. An examination with the finger discovered as a cause for this a tumor in the left naso pharyngeal space.

The examination which Dr. Erb was kind enough to make at my request, showed a considerably diminished sensibility of the left side of the face, corresponding to the second and third branches of the trigeminus. The sensibility and taste on the left half of the tongue were almost completely abolished. The sensibility of the region supplied by the first branch of the fifth pair on the left side is normal. The function of the muscles of mastication does not seem to be impaired. From these symptoms Erb judged that there was a tumor in the sphenopalatine fossa.

I saw the patient again about the middle of June. The condition of the auditory apparatus remained as given above. I did not see him again, but heard from him through a letter from Dr. Fischer, dated November 10, 1876, as follows :

"Remmele's condition has grown worse. He is evidently much weaker. Since his last visit he has not been able to leave his bed. Vertigo, a peculiar alteration in his mental faculties, amounting almost to a psychosis : melancholia ; sleeplessness, in spite of large doses of chloral and morphia ; intense pain, which drove him almost to suicide. The external swelling increased. The parotid was affected ; the left eye was pushed forward, almost to the condition of exophthalmus, at first highly injected and swollen, and later haziness of the cornea, followed by desquamation and cicatrization, and finally atrophy with loss of vision. Hearing remained bad.

"As the patient was dangerous to himself and others, and as his relatives were exhausted in consequence of the long-continued close watching, it was deemed best to take him to the hospital,

where he died in a condition of stupor and general exhaustion on March 6, 1876.

"The *autopsy* revealed a hard tumor the size of a small apple on the inner surface of the left anterior and middle cranial fossa, which on section was found to be a large whitish nodule, and under the microscope showed the characteristics of a sarcoma. The tumor was connected with the inner surface of the dura mater. The corresponding point on the anterior cerebral lobe was somewhat pressed in; the pia mater was injected in a punctiform manner. The cerebrum contained a moderate quantity of blood; the left eye was atrophic, the cornea opaque, partially flattened and cicatrized.

"In the region of the left parotid and lower maxillary region, a similar swelling was found, which extended upward into the left and middle cranial fossæ.

"Concerning alterations in the hearing apparatus, the records of the autopsy give no particulars."

CASE III. Nicholas Braunberg, 38 years old, a native of Wiesloch, was brought to the surgical clinic on April 23, 1872.

The hitherto healthy patient noticed the beginning of his present trouble at Christmas, 1877. The first thing observed was an ulcer in the region of the inner canthus of the left eye, which, however, discharged but little pus, but which, in spite of the employment of various remedial measures, refused to heal. He was at the same time unable to breathe through the nose, and it appeared to him as if both nostrils were stopped up. Somewhat later the palate was pushed forward into the oral cavity, and the whole pharyngeal space was filled by a tumor-mass.

*Status præsens*, April 23d: The strongly built, moderately emaciated patient, in whose internal organs no abnormality was detected, presented a remarkable flattening of the nostrils, with a simultaneous prominence of the osseous portions of the nose and the neighboring parts of the upper maxilla. In the region of the left nasal duct is an ulcer in the skin about the size of a dime, from which, on slight pressure, some pus escapes. Both nasal cavities are filled with a soft tumor-mass. This soft mass protrudes from a perforation in the left side of the nasal bone. Speech is indistinct and nasal. On opening the mouth, a soft protuberance, about the size of a half-dollar, covered with mucous membrane, is seen in the centre of the hard palate, at the periphery of which the osseous edge of the healthy portion is



distinctly felt. The soft palate is pushed forward by the tumor-mass which fills the entire pharyngeal cavity. General condition as yet good.

*Diagnosis: Sarcoma of the nasal and pharyngeal cavities, which has perforated the nasal bone.*

April 30, 1872.—Osteo-plastic resection of the middle portions of the superior maxilla and nasal bone, the flaps of the skin and bone being turned back on the forehead.

An incision running from the lower edge of the orbit at the side of the nose downward to the corner of the mouth, cut through all the soft parts to the bone, to the right and left. With a panel-saw the connections on both sides of the middle portions of the upper maxilla with the region of the first grinder tooth were severed, the portion enclosing the processus alveolaris in front of the edge of the tumor on the hard palate was cut across with a bone-knife, and then both nasal bones were loosened with the bone scissors from their connection with the upper maxilla. In this way a flap was made which comprised the nose, the upper lip and, in connection with the middle portion, the processus alveolaris of the upper maxilla (4 incisor and 2 canine teeth), and both nasal bones. The flap was turned upward, the unbroken bony connection between the nasal bone on one side and the frontal bone on the other serving as a hinge. The sarcoma was now exposed. It filled the entire nasal cavity, had forced its way through into the antrum of Highmore, and posteriorly reached up to the base of the cranium.

The whole of the tumor mass was removed by knife, shears and sharp spoons. The hemorrhage was stopped with the actual cautery and the *osteo-cutaneous* flap was replaced and united with button-sutures. The bones were united by numerous sutures inserted in the gums. The deformity is almost null, aside from the defect in the hard-palate.

The reaction in the wound was very slight. The defect in the hard-palate was the greatest cause of inconvenience since it allowed, in drinking, a small portion of the liquid to pass out of the nose.

The flap healed by first intention; the roots of the teeth are naturally loose.

*June 4th.*—Patient discharged. No return of tumor as yet.

*June 28th.*—Patient came back to the hospital with a return of the malady. The resected dental process is now tolerably firmly



fixed ; it seems as if the ligamentous connection with the lateral parts had been restored. Patient had become hard of hearing. He went home for four weeks. On his return to us the impairment of hearing on both sides had increased so much that he could be made to understand *only by very loud screaming*. This condition remained unchanged until his death which took place October 4, 1872.

*Sectio cadaveris :* Made on October 5, 1872, by Prof. Julius Arnold. Slight rigor mortis, skin white, great emaciation, muscles of a pale brown. Heart normal. In the lower lobe of the left lung a condition of great œdema and a strong hypostasis. A great deal of pus was found in the bronchi, and the mucous membrane was in a catarrhal condition.

Spleen, liver and kidneys show nothing special. The cranium behind the coronal suture somewhat pressed in and indented like a saddle. At the junction of the coronal and sagittal sutures two Wormian bones were found which had united at their circumference by means of a solid osseous connection with the neighboring parts. The interlacing parts of the sagittal and coronal sutures as well as the remaining portion of the frontal suture were synostotic.

On the dura mater nothing special was noted ; the pia mater on the convexity is also normal, but on the base of the cranium the dura mater corresponding to the anterior cranial fossa—especially the lamina vitrosa at the right middle cranial fossa and the sella turcica—is studded with soft, pulpy very vascular nodules. At these points the pia mater is adherent. The substance of the right cerebral lobe is hyperæmic and studded with small red spots, otherwise of a diffuse yellow color. The lamina cribrosa, the right orbital roof, the apex of the right temporal bone, the body of the sphenoid bone are all infiltrated with the pulpy mass, and more or less completely transformed into it. The region of the nose and upper maxilla very prominent and swollen. The right eyeball pushed forward ; in two places the skin of the tumor is perforated. A tumor mass was found on the roof of the oral cavity which was infiltrated with offensive fluid. The alveolar process of the maxilla were likewise involved in the tumor-mass, to which the teeth were loosely adherent. The pharyngeal vault as well as the nasal cavity was likewise filled with the mass.

*Anatomical diagnosis :* *Retro-pharyngeal sarcoma, perforation of the cranial cavity, oral cavity, nasal and maxillary fossæ.* Un-

fortunately I was allowed only an incomplete examination of the petrous bone, since a separation of this bone from the remainder of the cranium would have destroyed its value for the illustration of other points for which it was designed. What I did find was the following: The two nasal cavities were completely filled with the tumor, so that it would not have been possible to have introduced a metallic catheter of even the smallest dimensions, and so much the less, because the tumor had destroyed the greater part of the bony floor of the nasal cavity.

The examination of the pharynx in a vertical section of the cranium showed that the tumor sprang from the entire base of the cranium, the right half was intimately united with the walls of the right pharyngeal space, also in the region of *Rosenmüllers fossa* on the right side and with the *right* ostium. pharyn. tub. Eust. On the left side, on the other hand, which was likewise filled with the tumor-mass, there was no adhesion between the tumor and the anterior and posterior walls. Here there was a tumor springing likewise from the base of the cranium which was movable, and on the upper third there was a cleft going from behind forward through the tumor, but which did not completely divide it, giving one the idea that there were two tumors, the upper one being the smaller. By pushing the tumor aside, the space of *Rosenmüllers fossa* was found to be flattened out, as was also the tubal nipple. The opening of the pharyngeal end of the tube was round, the size of a pea, the wall moderately thick, and the edge of the orifice perfectly flat. A catheter 2 mm. in diameter was passed into the tube about 2 cm., but it was not possible to force air into the tympanic cavity.

Both external canals were free. The *M. TT.* were not altered as to color, but sunken, and lay against the central part of the promontory. The short process was very prominent. So far as an external examination of the middle cranial fossa warranted an opinion, the remaining portions of the organ of hearing were intact. The tumor which had grown in the region of the apex of the right petrous bone in the middle cranial fossa, was  $2\frac{1}{2}$  cm. in its greatest breadth, and 3 cm. in its greatest length. On its anterior surface it was concave, on its posterior surface convex. Its posterior extremity was directed toward the labyrinth. Yet there was an unfilled space of about 2 cm. between the posterior edge of the tumor mass and the *eminentia arcuata*, so that an affection of the labyrinth could hardly have come from

a growth of the tumor from this direction (or from below either).

To the outer side of the one just described there lay a second tumor somewhat larger in its diameter, whose posterior limit fell about 1 *cm.* short of the other, leaving the osseous covering of the middle ear intact.

The tumor on the apex of the left petrous bone, on account of its small size—it was about the size of a hazlenut—was considered of no consequence in its relation to the other parts of the petrous bone, which, to all outward appearances, were intact.

In endeavoring in this case to deduce from the symptoms of the new formation in the pharynx presented during life and the appearances found after death, some important facts as regards the symptomatology and treatment of future analogous cases—disease of the temporal bone as a complication of new formations in the pharynx—we will find, apart from the examination with the Rhinoscope and the finger, and the difficulties in respiration and deglutition, the following of more or less weight:

1. The constant impermeability of the Eustachian tube, by all methods, a certain proof that the new formation has already affected the tube, or that the tube has already been absorbed in the tumor-mass.

2. In consequence of the impermeability of the tube, an excessive sinking of the *M. T.*

3. A more or less considerable purulent inflammation of the mucous membrane of the tympanic cavity, as a symptom of the invasion of the region of the middle ear by the new formation.

4. Aside from the other symptoms of purulent otitis media, and aside from the pain consequent upon this, a persistent headache in consequence of pressure exerted by the enlarging new-growth.

5. Continuous severe subjective noises, due, either to increase of intra-auricular pressure or hyperæmia of the labyrinth, as symptoms of the involvement of this region in the tumor, or to both.\*

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\* A complete cessation of the subjective noises in spite of the progress of the tumor was possible in this case, owing to the fact that the whole labyrinth was involved in the tumor-mass. The large pearl-tumors in the temporal bones seem to favor this opinion.

6. Abolition of bone conduction for all kinds of tones.

7. The high degree of deafness, or complete abolition of hearing power.

8. The swelling of the cervical glands as a special indication of the malignancy of the new-growth.

So long as the labyrinth and tympanic cavity are intact, and the impairment of hearing is due alone to the impermeability of the tube, a palliative means for the improvement of hearing is to be found in paracentesis of the *M. T.*, care being taken to keep the artificial opening patent. So soon as the involvement of the tube in the tumor is demonstrated, further operative procedures are of doubtful utility.

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### C.

ORGANIC ALTERATION IN THE ORGAN OF HEARING IN A CASE OF AUDITORY HALLUCINATIONS WITH PSYCHIC DERANGEMENT.

*Chronic catarrh of the pharynx and the whole middle ear on both sides. Chronic otitis of the cranium and the temporal bone. Chronic periostitis of the tympanic cavity, with partial ankylosis of the ossicles, especially on the right side. Shortening of the tensor tympani on the left side. Senile alterations in the cellular structure of the labyrinth. A high degree of deafness, greater on the right side than on the left. Psychic derangement with hallucination of hearing coming from the left side.*

Justine Lender was in her 70th year transferred from the Frankfort Almshouse to the City Insane Asylum, where she died in her 75th year. She emigrated from Würtemberg, and was in service in Frankfort until her 36th year, at which time she married. Her husband squandered her hard-earned property and mistreated her so that she obtained a divorce and again entered service, where on account of senile marasmus and arthritis, she remained until she was brought to the almshouse, where the mental derangement was developed. Already in her last service she heard in her room a

noise of blows or as if something were moving about, which she finally became convinced was the ghost of her husband who was now dead. His persecution of her increased with time; he rejoiced in being able to torment her and left her no peace either day or night. He howls into her ears, he beats his fists, makes a noise like a sewing machine and hammers, roars and grinds his teeth like a lion, and pretends he is going to swallow her like a tiger, &c. During her stay in the institute she sometimes stopped her ears on account of the noises, especially the right, (and demanded that the tormentor be driven out of it) and was often very restless and noisy on account of her hallucination.

The character of her delusions of hearing changed in the course of time; she heard, for example, the cries of children; they were the cries of her "own" child, though she had never had any children. She seems to hear some one torturing them, the children cry out for help, then they are murdered, etc. Sometimes the children sing beautiful songs. "Do you not hear how he howls, how he saws in the ear; Hoo, hoo, hoo, bum, bum, bum; like metal, or chains, etc."

On April 8, 1871, the following was noted in regard to the hearing power: "On the right side the patient has heard nothing for a long time. A loud ticking watch was not heard either before the meatus, nor on the mastoid process, nor on the vertex. The left ear has also gradually become hard of hearing. It is necessary to speak very loud to her. All hallucinations seem to reside in the left ear." The record does not give an account of any further examination of the hearing apparatus.

During the latter part of her life a sarcoma ventriculi was developed. She suffered from almost constant vomiting until her death which took place on January 14th.

The *sectio cadaveris* was made fourteen hours after death by Dr. Lotz. The record shows:

The cranial bones bloodless, white and thick. Diplôë absent. Inner table thickened, not united to the dura mater. Sutures preserved.

Atrophia cerebri, hydro-cephalus externus. Striæ acusticæ very indistinct. Atheroma of the arteries at the base of the cranium. Senile thickening of the apex of the right lung. Hyperæmia and œdema of the remaining portions of the lungs. Pseudomembranes on pleura. Heart fatty. Stenosis of the *bicuspidis*. Atheroma of the aorta, carcinoma ventriculi.



*Examination of both petrous bones.* The bony substance sclerosed. Both meatus normal. *Right M.T.* very concave in the prolongation of the axis of the handle; in the lower posterior quadrant two small atrophic spots. Light spot somewhat indistinct. Mucous membrane of the *M.T.* opaque, the tympanic cavity itself much thickened, especially on the promontory. The malleo-incudal and stapedo-incudal articulations stiff. The plate of the stapes not at all movable. Walls of the tympanic cavity hyperostotic, and in consequence of these alterations the round window whose diameter amounts to only  $\frac{1}{2}$  mm. is almost inaccessible. *Left M. T.* funnel-shaped, thickened in all its layers, with only the short process, which, together with the partition fold of the *M. T.* is very prominent, visible. The handle not visible on account of an excessive shortening of the otherwise very thin tensor tympani; the handle passes transversely over the inner surface of the opaque *M. T.*, its top looking toward the tympanal orifice of the tube.

The ossicles in their articulations are stiff, but movement is at no place entirely absent. The diameter of the round window amounts to about 1 mm. In consequence of the hypertrophy on the promontory, this also is difficult to get at. (The measurements were taken from both sides of the labyrinth.) The microscopic examination of both tensores tympanorum showed a normal condition of the muscular substance, on the left side a slight increase of the intermuscular connective tissue. The posterior wall of the pharynx and the mucous membrane on the basis cranii were covered with thick yellow scabs. Rosenmüller's fossa on the right side much shallower than on the left. In the ostium pharyngeum of both tubes there was a moderate quantity of glairy mucus. Both tubes impermeable for small sounds and air bath. The examination of a cross section showed on both sides: 1, a disappearance of the folds and prominences on the floor and lateral walls; 2, Hypertrophy of the submucous tissue, and 3, of the tendinous fibres of the tensor veli palati.

*Right labyrinth:* The membranous semi-circular canals very atrophic, particularly when compared with the left side. On both sides, the epithelium on the membranous semi-circular canals as well as in the vestibular structures, and also the cellular tissues of the lamina spiralis membrana, showed a great richness in fatty globules (evidently senile changes); the substance of the pillars of Cortis arches had preserved its normal homogeneous appearance.



The condition of both petrous bones offered as a whole nothing remarkable. It represented the terminal condition of a slow inflammation in the middle ear, which in this case originally began in the mucous membrane of the pharynx, and finally led to closure of the tube, sclerosis of the mucous membrane and ankylosis of the ossicles.

*From a physiological point of view it is remarkable that the hallucinations of hearing proceeded from the left side.* Is this due to the fact that the function of the left ear was less impaired than that of the right, or was it that the subjective noises, on account of the great shortening of the tensor tympani, and the attendant diminished movability of the ossicles, were more intense on the left side than on the right, and as a consequence the delusions of hearing had their origin there? This question is difficult to answer, because auditory-hallucination can arise from objective sounds as well as subjective. If a division of the tendon of the tensor tympani can bring about a permanent relief to the subjective sensations of sound, which, it is true, yet remains to be proven, then the answer to this question in the affirmative has a no inconsiderable importance for practical psychiatrics, particularly as regards the therapeutic management of cases like the foregoing, where the psychosis was initiated by hallucinations of hearing.

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D.

TRAUMATIC DISLOCATION OF THE MALLEUS AND INCUS,  
WITH MEMBRANA TYMPANI INTACT.

*Fall on the head, probably the right side; fissure of the right frontal bone; diastasis of the right coronal and squamous sutures; hemorrhage between the dura and the cranial bones on the right side; laceration of the meningeal artery; hemorrhage in the pons cerebri; dislocation of the hammer and anvil.*

M., 19 years of age, merchant, fell on February 1, 1873, in a

place of amusement down the cellar stairs. Immediately after the accident he felt no particular inconvenience, drank a glass of beer with his comrades, and went alone to his home—a walk of about ten minutes. The next morning he was found unconscious. He died on February 2d. *Sectio cadaveris* on February 3d by Prof. Julius Arnold. Rigor mortis well marked, strong bony structure, skin white, abundant subcutaneous connective tissue, dark red muscular tissue. In the right temporal region the skin somewhat shrivelled, very prominent; suggillation. In the same region an extensive hemorrhagic infiltration of the connective tissue and the scalp.

The coronal suture on the right gaped to a considerable degree. In its upper division there was a fine fissure extending two inches into the frontal bone, which forked at its termination. At the junction of the coronal and squamous sutures a fissure runs through the anterior inferior division of the frontal bone directly downward, and, after running a short distance, again passes into the suture between the sphenoid bone and the squamous portion of the temporal bone. The suture between the squamous and petrous portions of the temporal bone is ruptured, and there is blood in the interspace. The coronal suture likewise shows on the left side a slight diastasis.

The dura mater is loosened, and the cavity caused thereby—of about the size of the fist—in the middle cranial fossa, is filled with coagulated blood. This blood seems to have come from a wounding of the arteria meningea media close to the foramen rotundum. The right temporal lobe of the brain is compressed. In the corpora quadrigemina and pons are numerous punctiform hemorrhages. Brain otherwise normal.

*Anatomical diagnosis:* Hemorrhage between the dura and skull; fissure in the right frontal bone; diastasis of the coronal and squamous sutures; rupture of the arteria meningea media. Hemorrhage into the pons cerebri.

*Right petrous bone:*\* External meatus normal. *M. T.* intact, the periphery and the division above the short process slightly hyperæmic, otherwise normal. The bony covering of the antrum mastoideum, and the cells of the mastoid process itself, suffer from a bluish-black suggillation; in the cells themselves there was dark coagulated blood. In the tympanic cavity slight hyperæmia,

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\* The preparation is in the collection of the Pathological Institute.

especially at the periphery of the *M. T.* and the head of the hammer, the connection between the upper tympanic wall and the head of the hammer severed (rupture of the ligamentum mallei superius). If this is moved with a probe, the whole hammer hangs loose on the *M. T.*, but it is not entirely detached from it, the connection is only less close than normal. The stapes lies obliquely in the tympanic cavity, with its body against the neck of the hammer, with its tympanic process against the posterior wall of the tympanum, and its detached stapedial process against the niche of the oval window.

The macro- and microscopic examination of the labyrinth showed nothing abnormal. The sheath of the facialis was, from its second bending, abundantly infiltrated with blood.

What part the concussion of the temporal bone from the falling on the head played in the dislocation of the two first ossicles, and what the too strong traction and the loosening of the dura mater, is difficult to say, in the first place, because the malleo-incudal articulation lies near the fissura petro-squamosa, which was ruptured; and secondly, because through this fissure numerous connective tissue bands pass into the tympanic apparatus.

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E.

CONDITION AFTER A NATURAL HEALING OF A PURULENT INFLAMMATION OF BOTH TYMPANIC CAVITIES.

*Tuberculosis pulmonum.* *Absence of symptoms of any ear disease during life, notwithstanding a condition of considerable alteration in the sound-conducting apparatus on both sides, as a result of an early purulent inflammation in the left ear.*

Arthur Glass, twenty-six years old, was brought on May 11th, 1874, to the clinic of Prof. Friedreich. The patient is an instrument maker from Gosslar.

*History:* Five weeks before, a severe cough and diarrhœa; previously only now and then some cough, without expectoration or hemoptysis. For five weeks, moderate fever, poor appetite, and great debility. Frequent night-sweats. There was no occasion to examine into the function of hearing since the patient's hearing was not impaired.

*Status præsens*: An examination revealed the existence of a chronic, probably caseous, pneumonia of both lungs; otherwise nothing worthy of mention. The further course of the disease did not notably differ from that of a rather rapid phthisis of the lungs. The diarrhœa soon diminished in severity, with only occasional exacerbations. About fourteen days before death a laryngitis made its appearance (finally complete aphonia). Death took place on September 19, 1874, five months and a half after the appearance of the pronounced phthisical symptoms.

The hearing power always seemed normal. At no time was there any trouble in the hearing apparatus sufficient to call for a careful examination during life. (The petrous bones had been removed from the cadaver for an entirely different purpose).

*Sectio cadaveris*: made by Prof. Arnold on Sept. 20th, 11 A. M.

*Anatomical diagnosis*: chronic ulcerated bronchitis, bronchiectasia, chronic caseous peri-bronchitis, and broncho-pneumonia. Cavities in the apices of the lungs, acute catarrhal pneumonia, miliary tubercles in the lungs, liver, mesenteric glands, tuberculous ulceration in the intestines, pharynx and larynx.

Examination of both petrous bones:

*Right*: External meatus contains much epithelium; the inner half, especially posteriorly and upward, red, *M. T.* funnel-shaped, a retraction of about the size of a pin's head above the short process, the layers on the posterior half thickened. Mucous membrane of the tympanic cavity hypertrophic, encasing the ossicles. Ossicles somewhat restricted in movement at their articulations. The roof of the tympanic cavity bluish-red, and rarefied; the same in the bony portion behind the eminentia arcuata, as far as the base of the petrous bone; in this region the dura mater is at points adherent, and there is a small opening with serrated edges (from former caries?).

*Left*: External meatus free. The *M. T.* presented before and behind the handle a large oval cicatrix: the rest is so thickened that no portion of the hammer is visible. The whole *M. T.* is drawn toward the promontory by means of a cicatrix. The hammer with its very much shortened handle (probably in consequence of a former necrosis) is drawn inward. The mucous membrane of the tympanic cavity somewhat thicker than normal. Articulations of the ossicles free. At the bony roof of the middle ear there was an adherence of the dura mater, and a small opening (carius?) in the bone. The labyrinth was not examined.

This is a remarkable example of natural healing of a purulent inflammation in both tympanic cavities, accompanied, most probably, by caries on the right side. Both ears were evidently not normal in their functions, but the disturbances were not marked enough to cause the patient to complain of impaired hearing, and the physician, Dr. Schultze, who treated him for a long time and watched him carefully, did not at any time observe defect in the function of hearing. It is possible that the original affection of the ear dated so far back that he had forgotten it. Such remarkable cases of natural healing offer much encouragement for a persistent treatment of those well-known rebellious cases of purulent otitis.

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F.

ANCHYLOSIS OF THE STAPES ON BOTH SIDES WITH ONE-SIDED CLOSURE OF THE ROUND WINDOW.

*Chronic purulent inflammation of both tympanic cavities of more than twenty years' standing. Total deafness on right side; loud voice heard on the left when spoken directly in the ear, up to the time of death. Anchylosis of the stapes on both sides. Closure of the fenestra rotunda on right; intact on left side.*

Samuel Moser, aged 64. Before he came under my observation, on November 15, 1872, he was under treatment in Prof. Friedrich's clinic on account of diabetes mellitus.

According to the statement of the patient, the ear trouble dated twenty years back, yet may have existed longer, for the patient does not remember, notwithstanding the alterations to be mentioned, whether he had pain or a discharge from the ear; neither is he able to assign any cause for the trouble. On the other hand, he complains of intense tinnitus on both sides.

The external meatus on the right side is filled with thickened pus and epithelium. The handle portion of the *M. T.* and the parts immediately in front of and behind it are preserved; the shortened end of the handle is drawn against the promontory, the rest, as well as the mucous membrane of the labyrinth wall, which is visible, are thickened and red.

The external meatus on the left side is free ; the *M. T.* is lacking in the greater part of its extent ; in front and behind a small rim is left ; the mucous membrane of the promontory red and much thickened. The hammer portion and the long shank of the incus not visible. On the right side there is total deafness for all tones, through the air as well as for bone conduction. On the left also there is lack of bone conduction, but by speaking loudly in the left ear, the record says, the patient can distinguish words, and the tuning forks *C'*, *C''*, are heard when vibrated in front of the external meatus. This minimum of hearing for speech and the discharge from the ear continued until his death, which took place on September 9, 1874, in consequence of œdema and gangrene of the lung.

*Sectio cadaveris* made on the following day by Prof. J. Arnold.

*Anatomical diagnosis.*—Gangrene of the upper lobe of the left lung ; left-sided catarrhal pneumonia ; œdema of both lungs, recent hyperæmia of the liver and kidneys ; senile atrophy of the brain ; dilatation of the art. basilaris ; diabetes mellitus.

*Examination of the petrous bones.*—Both external meati contained a moderate quantity of greasy pus.

The *right M. T.* showed, aside from the alterations already mentioned, anteriorly and upward, a cicatricial condition, and a retraction in the direction of the ostium tympanicum tubæ, so that, in spite of the great defect in the membrane, a communication existed only with the posterior portion of the middle ear. In the centre of the cicatrix two depressions the size of a pin's head quite near each other, probably partial adhesions of the cicatrix. Malleo-incudal articulation was embedded in the excessive hypertrophy of the mucous membrane of the tympanic cavity, but movable. The same is true of the incudo-stapedial articulation. On laying bare the stapes-plate and the round window from within, the stapes was found to be ankylosed and the round window filled with a bony substance.\*

*Left M. T.* is destroyed up to the periphery. Hammer and anvil are wanting, with the exception of the long process of the

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\* After the microscopic examination of the labyrinth, I ordinarily make an incision with a fine saw about one-half to one inch from the base of the stapes, which passes through the long axis of the petrous bone, and in a direction nearly parallel to the base of the stapes. In this manner we obtain very readily a view of both windows from within, and the preparation is saved for a demonstration of its tympanic portion.



incus, which is fixed by a growth of connective tissue and displaced in a horizontal direction. On account of the great hypertrophy of the mucous membrane of the tympanic cavity, the communication with the mastoid cells is almost entirely cut off. The mucous membrane of the promontory shows, in addition to the general hypertrophy, some isolated connective tissue fibres. Two of these extend in an oblique direction, one above the other, like a bridge, toward the anterior periphery of the annulus, shutting the drum cavity off from the tympanic orifice of the tube. The stapes is ankylosed, the round window intact.

In the labyrinth the periosteal covering in the right vestibule, as well as the connective tissue membrane of the vestibular structures, is thickened; there is, moreover, an increased quantity of otoliths. Otherwise I found nowhere any marked anomaly.

With the *exception of its etiology*, the case resembles, both as regards the defect in hearing during life, and alterations found after death in the oval and round windows, one that was published by me some years ago.\* Whilst in that case the alterations in both labyrinth windows represented a hyperostosis of the petrous bone accompanying a hyperostosis of the cranial bones, the cause in the case just related of the alterations in the labyrinth windows was a purulent inflammation of the mucous membrane of both tympanic cavities. But even here, notwithstanding the long continuance of the trouble, there was no appearance of secondary alteration in the labyrinth. The impairment of function during life and the changes found after death also demonstrate the functional importance of the round window, as did the other case.

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## G.

### RESULT OF AN EXAMINATION OF A DEAF-MUTE.

Magdalena Stadler, 29 years old, from Ziegelhausen, was brought to the clinic of Prof. Friedreich on February 20, 1875.

*Clinical diagnosis*:—Pleuritis obsoleta lateris dext. ; Pneumonia

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\* Archiv. f. Ohrenhielk. Bd. II, p. 190, et seq.

chronic. lat. dext. Terminal disease—Meningitis tuberculosa. Furthermore, a congenital deaf-mute. During the last days of life, May 18th, a marked left-sided facial paralysis. On May 17th, left-sided earache. Death on May 21st.

*Anatomical diagnosis.*—Obsolete pleuritis dext. ; sacculated and partially caseous empyema ; ulcerative cavities in the apex of the right lung ; bronchiectasia, peribronchitis fibr. and caseosa of both lungs ; miliary tubercles in both lungs, the pleura, liver, spleen, omentum, intestines and choroidea, meningitis tuberculosa basilaris, and of the brain ; tubercular meningitis of the spinal cord ; œdema cerebri.

*Right petrous bone*—Bony substance sclerosed ; external meatus normal ; *M. T.* flat and opaque ; epidermis and the cuticular layer, except at the lower and anterior portion, so much thickened that only the short process is visible. The mucous membrane of the tympanic cavity, especially the part belonging to the *M. T.*, much hypertrophied ; the approach to the round window is, through the hyperostosis of the floor of the drum, in a measure obstructed, the round window filled with bony substance ; all the articulations are ankylosed ; the structure of the musc. tensor tymp. *normal*. The tubes on both sides show a moderate cellular infiltration in their mucous membranes, the submucous tissue, the glands and the interacinose tissue.

*Left petrous bone*—External meatus red at its upper-inner end ; *M. T.* funnel-shaped ; short process prominent ; handle somewhat shortened in perspective ; mucous membrane of the tympanic cavity and *M. T.* thickened ; malleo-incudal articulation and the connection between the anvil and the tympanic cavity but slightly movable. The incudo-stapedial and stapedo-vestibular articulations immovable ; round window closed with bone ; tensor tympani not shortened ; structure of the muscle also *normal* on this side.

The examination of the labyrinth gave on both sides the same result ; great quantity of otoliths and numerous colloid bodies in the ampullæ, the membranous saccules and the lamina spiralis membranacea.

Nothing worthy of mention was noted at the porus acusticus.

The results of the examination of the foregoing case show many points of analogy to the case of deaf-mutism which I

described in these ARCHIVES, vol. iii, No. 2, p. 193, Sec. viii.

We have to do here probably, with the result of an early (probably congenital) periostitis of the petrous bones. The evidence of this is the sclerosis of the substance of these bones, the ankylosis of the ossicles, the partial hyperostotic condition of the bony walls of the tympanic cavity, and the closure of the round window. I look upon the small-celled infiltration found in the mucous membrane of the Eustachian tube as a symptom of an acute catarrh accompanying the miliary tuberculosis.

In this as well as in the other case of deaf-mutism described by me, the structure of the tensor tympani was normal. This normal condition, however, does not furnish a confirmation of the opinion of Magnus, (compare *Archiv f. Ohrenh'lk.*, Bd. xi, 3 and 4, p. 248), "that this muscle has no acoustic function, but is only a mechanical means of protection for the steadying and preservation of the hammer, that is of the ossicles, and *M. T.* against the violence which threatens them by sudden forcing of air through the tub. Eust. in sneezing, etc, (Virchow's *Archiv*, xx, p. 102, et seq.). Otherwise would the muscle, condemned to inactivity, undoubtedly become atrophic and undergo fatty degeneration." In opposition to this I desire to repeat some remarks made by me five years ago, (l. c.):

"From a physiological point of view it is of interest to note the normal microscopical condition of the tensores tympani. Although these have not exercised their function for hearing purposes during the life of the 64 years old deaf-mute, *yet there has been no fatty degeneration*; we find the reason for this in the anatomical connection between the musc. tens. veli palatini and tens. tymp., first pointed out by Ludwig Meyer, (*Studies über die Anatomie des Canalis Eustachii*, München, 1866), and verified by Kessel and others. The continual action of the tens. tymp. in the act of swallowing has prevented their fatty degeneration." It is probable that the presence of the colloid substance in the labyrinth (in the foregoing case), is in intimate connection with the congenital deaf-mutism, respectively with the abolition of the function of hearing.

## H.

## FOREIGN BODY IN THE EAR. DEATH FROM REPEATED VIOLENT EFFORTS AT EXTRACTION.

*Penetration of a fragment of stone into the right external meatus. Repeated forcible attempts at extraction. Violent contractions in the region of the right facialis during the last attempt, followed soon by paralysis of the nerve. Traumatic perforation of the lower wall of the tympanic cavity, with repeated aural hemorrhages from the purulently inflamed vena jug. int. Injury of the canalis facialis. Septicæmia with metastatic deposits in the lungs and muscular tissues of the right lower extremities.*

On June 20, 1876, Adam Schneider, a day laborer, from S——, in the Rhine Palatinate, 41 years old, was brought to the surgical clinic in Heidelberg, with the following history :

On June 15, 1876, the patient was engaged in raising a paving-stone out of the ground, when a blow on the stone by means of a sharp pick caused several large and small splinters to fly off, one of which struck the right auricle and remained fixed at the opening of the external meatus. The patient attempted its removal with his hand, but was so awkward about it that the splinter was pushed more deeply into the canal. The same day he went to Dr. X., who, *without any preliminary examination*, attempted to remove it by means of a grooved forceps, which occasioned a flow of blood. Violent pain then set in, on account of which he consulted, on June 18th, another physician, Dr. Y. This physician also, *without any examination*, made further forcible, very painful efforts at extraction, which were accompanied by convulsions of the right side of the face and a hemorrhage. These convulsions were so considerable that the patient called the attention of the physician to them, without, however causing him to desist from further fruitless efforts at extraction.

The convulsions continued during the day, but ceased the following day, and have not returned since. On June 19th there was a purulent discharge from the right ear ; the pain has been inconsiderable, but, on the other hand, he has almost continuous dizziness. The night after his admission to the clinic he hawked up some blood, which seemed to him to have "trickled into his throat."

On July 1st, 9 A. M., an examination was made by Prof. Lossen under chloroform. Result—No foreign body visible, *M. T.* perforated.

At 12 M. the same day I examined the patient at the ear-clinic.

*Status præsens* :—The opening of the external meatus suffused with blood, the middle portion swollen and granulated on the posterior wall ; no foreign body visible.

That a perforation of the *M. T.* existed was proven by the fact that water injected into the tube flowed out at the external meatus. Moreover, there was a paralysis of the muscles supplied by the right facial nerve and complete loss of hearing power for watch and speech.

Ordered—Complete rest, occasional instillations of warm water into the external meatus.

Temperature—Morning, 39.0 C. ; pulse, 120. A chill late in the evening.

*July 2d.*—Morning temp., 38.5 ; pulse 90. Small hemorrhage from the right ear, dizziness ; pupils equal. Ice bladders to the head. Instillations of warm water. Evening, pulse 120 ; very feeble.

*July 3d.*—After a good night's sleep, pulse 120. Continuation of the iced applications.

At 12 M. I saw the patient again for the first time since the second day. He was very anemic, and showed the highest degree of weakness. He understood questions with great difficulty. In the external meatus up to the incisura intertragica there was a large blood-clot. After its removal, and immediately after washing the ear out with a rubber syringe, there suddenly came a stream of from 3 to 4 ounces of dark blood. The swelling of the meatus was diminished.

The *M. T.* was seen to be perforated, and beyond the opening, dark, fluid, pulsating blood. After the examination the patient fell into a fainting fit, which lasted for some minutes.

The instillations of warm water were discontinued. In the course of the day some pus flowed out of the ear ; the right lower extremity was smaller in places and painful. In the evening, pulse 100. He passed the night of July 4th quietly under the use of ice. Toward mid-day renewed hemorrhage and chill. Evening, pulse 96, very irregular.

In the night of July 4th-5th he was very restless, spat a great deal

of blood, and sprung often out of the bed. Toward morning, delirium. Conjunctiva and skin of a yellowish tinge. Intense headache and thirst. Urine contains albumen and biliary coloring matter. Continuous pain in the right leg. Evening, pulse 120.

*July 6th.*—Skin intensely yellow. Temp. very high. Excessive flow of pus from right ear.

Toward mid-day the patient scarcely replied to questions. Tongue dry. Respirations laborious. He died the following evening at 7 o'clock without any further symptoms on the part of the brain.

*Sectio cadaveris*, fourteen hours after death, by Prof. J. Arnold.

Well-marked rigor mortis; intense yellowness of the skin; the right thigh somewhat the thicker; the skin discolored, green, over a great extent of surface: it, as well as the right calf, pitted on pressure.

Subcutaneous cellular tissue moderately rich in fat; muscular tissue dark red and glistening.

Corresponding to the discoloration of the right lower extremity, there is a purulent infiltration of the muscular tissue in a more or less advanced state of decomposition. Veins on both sides normal.

In the *pericardium*, yellowish serum.

In the *heart*, a quantity of clotted blood; endocardium and valves of both sides, apart from the yellowish color, normal.

The *myocardium* of both sides of the heart showed a normal thickness and consistency.

In the left pleural cavity, a moderate quantity of yellow, offensive fluid. The *plura costalis* and *pulmonalis* are lined with yellow coating, and in some places it is of a deep red, in others of a more yellowish or greenish tinge. Turbid mucous in the *bronchi*. Branches of the *a. pulmonalis* free.

The tissue of the *upper lobes* contains air and is elastic, moderately supplied with blood, and œdematous; the upper back portion has somewhat less air, is very œdematous and congested. The *lower lobes* in general elastic, tolerably congested and moderately œdematous. The tissue so affected is infiltrated with larger and smaller cell-collections, which are broken down for the most part in the centre, and resemble cavities containing sanious pus. At the periphery there is a zone of yellow, infiltrated tissue, and the sound tissue is separated from the collections by a dark-red zone (?).



*Right lung.*—Throughout a great extent it is united to the costal wall by means of a tolerably firm pseudo-membrane. Bronchi and art. pulmonalis as on the left side.

*Tissue of both upper lobes* contains air, is elastic, moderately œdematous and congested. In the lower lobes many collections of the same character as those on the other side.

*Spleen* large, tight, congested, soft.

*Left kidney* large; cortical substance slightly congested; general yellowish discolorations; extremely dull; medullary substance somewhat congested.

*Right kidney* in essentially the same condition, only the dulness and swelling are greater.

In the *gall bladder* a good deal of brown liquid bile.

*The liver* is adherent by its anterior substance to the diaphragm. Tissue congested. Acinous structure preserved; centre of acini somewhat dull; the skull-cap thin but compact; sutures normal; dura mater generally of a yellowish color; a recent blood spot in the *sinus longitudinalis*. In the lateral sinus there was a recent clot, not adherent to the walls.

*Pia mater* over the cerebral hemispheres strongly infiltrated with serum, more on the right side than on the left; somewhat dull. Dense infiltration in the pia and arachnoidea at the base of the brain. Over the pons the soft cerebral covering was discolored. Corresponding to the clivus the dura mater was covered with a very vascular tissue, which was studded with ecchymoses, and was very thick on the right side.

Aside from a moderate filling of the vessels and œdema, the substance of the brain presented nothing of special moment.

*Anatomical diagnosis:*—*Metastatic septicæmia from wounding of the ear; metastatic foci in both lungs, as well as in the muscular tissue of the right lower extremity.*

*Examination of the right petrous bone.*—The external meatus filled with a dark, tolerably thick blood clot. *Cutis of external meatus* swollen and covered with a greasy secretion. On the posterior wall, at the point where it passes into the bony meatus, it is thickly granulated. Bony meatus deprived of its periosteum. The last third of the lower wall hyperæmic and in places rough (commencing caries).

*M. T.* gone, with the exception of a part of the anterior edge, which is loosened from the annulus and partially displaced toward the ostium tympanicum tubæ. The wall of the labyrinth is de-

prived of its periosteum. The *hammer* is drawn inward and upward. The end of the handle rests on the anterior edge of the oval window. The stapes not seen. The incus is preserved. The end of its long process rests on the posterior wall of the oval window. At the point where the chorda tympani leaves the canalis facialis there is an irregular opening about the size of a lentil, through which a thick probe can be passed a short distance into the canalis facialis.

The chorda tympani is destroyed up to near its entrance into the fissura Glaseri. In the *floor of the tympanic cavity*, an obliquely oval opening, whose long diameter is about  $\frac{1}{2}$  cm., with a transverse diameter about half the length. This opening leads into the vena jugularis, whose inner wall is infiltrated with pus and yellow for the extent of about  $\frac{1}{2}$  cm.

*No sign of a fragment of stone anywhere.*

Since the condition of the labyrinth did not appear to offer anything which could throw any light upon the case, and as it was desired to preserve the preparation, which was not mine, for the collection of the Pathological Institute, an examination of this structure was not made.

Every one will agree with me, I think, when I express the opinion that *the fatal termination is, unfortunately, due to the interference of the physicians.* How much is to be laid to the first and how much to the second practitioner it is now difficult to say. It would be of no practical importance to decide the matter unless the case should come before a court of justice. *From a scientific point of view both have committed an error in treating the case without a preliminary examination.* If the foreign body had remained in the ear the patient would be living to-day!

As immediate consequences of the forcible interference are to be reckoned: The destruction of the chorda, the peeling off of the periosteum, and mucous membrane of the bony wall of the meatus and of the wall of the labyrinth, the altered position of the first two ossicles, the opening in the canalis facialis, and in the floor of the tympanum, provided, that there was not a dehiscence in both regions, of which I, however, have found no evidence by the closest

scrutiny of the petrous bone. Fridlowsky\* has described such a condition in the lower tympanic wall; no description of one at the place where the chorda leaves the canalis facialis is known to me. If we admit that the two openings in the bone, of the size indicated, were formed later,—which is improbable from the circumstance that the pain was inconsiderable from the 18th of June,—then must the efforts of extraction, which yet were the primary cause of their existence, have been violent in the highest degree, more particularly as the anatomical relations of the affected region were normal before the accident!

#### CONCLUDING REMARKS.

In the introductory to the first series of autopsies in Ear Diseases, in the third volume of these Archives, p. 173, I said: "If the careful reader find some data which are of value not alone to the specialist, but to the general practitioner, I beg to state that the credit is primarily due to those of my colleagues who so liberally furnished me the histories and material."

I can, in looking back over this second series, only repeat these words. The building up of a scientific otology is in fact only possible when physicians, clinicians, and pathologists, show such a warm interest and helping disposition toward the aurist, as is revealed in the foregoing communication. Only in this way can the material for scientific research be furnished. That this mutual assistance has been a mutual advantage in the cases above described the reader will certainly willingly acknowledge when he bears in mind that they, though few in number, have not been limited to the domain of otology, but have, almost to the same extent, entered into clinical medicine, surgery, ophthalmology, psychiatrics, and forensic medicine.

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\*In the 12th chapter of Diseases of the Ear, by Toynbee, it is recorded that he found in 1013 sections of ears, the lower tympanic wall defective 25 times; whether this condition was always pathological, or whether the instances of dehiscence were included, is not clear. It is expressly said in regard to the upper wall: "In many preparations this layer (the upper bony roof of the tympanum) is partially defective, and the dura mater of the petrous bone comes in immediate contact with the mucous membrane of the tympanic cavity." Of the canalis facialis it is said: "It not infrequently occurs that the inner bony wall of the canal is defective, and in this manner the mucous membrane of the tympanum is in direct contact with the outer surface of the nerve, etc." In regard to the defective development of the lower tympanic wall, nothing special is said.

## A CASE OF OBJECTIVE AURAL SOUNDS.

BY DR. E. L. HOLMES, OF CHICAGO.

MISS C. M., 17 years of age, seamstress, suffered in early childhood from a disease of the ears, which she cannot describe. Since that time she has been very slightly deaf, colds having but very little effect on the hearing. She does not remember that she ever suffered from otorrhœa.

The patient has always been pale and quite delicate, and is evidently at present depressed by overwork and confinement. She is often troubled with a light cough. The thyroid gland is somewhat enlarged. At times there have been spasms of the muscles of the left forearm and left side of the chest.

There are involuntary spasmodic elevations of the larynx, as in swallowing, accompanied by a peculiar sound in each ear, distinctly audible at the distance of eighteen inches from the patient on the left side, and five or six inches on the right side. The patient cannot remember when, in childhood, these two phenomena did not exist.

I can best compare the sound to that produced by a firm sudden rubbing of a lock of one's hair near the ear, or by a single sharp mucous râle. I can quite well imitate the sound by rubbing the edges of the thumb and finger nails *obliquely* over each other.

Each sound can be subdivided into a louder first part, and a second part less loud; and yet each sound is quite short. They occur, as also the spasms of the pharyngeal muscles, nearly forty times a minute. They also remit as regards the intensity and the intervals. The patient states that the sound in the right ear seems

like a faint echo of the sound in the other ear, following it at a very short interval. The act of swallowing, or holding the breath increases the distinctness of the sounds. "A cold in the head" diminishes it, but does not greatly increase the deafness.

The sound seems invariably to proceed from the external meatus. When the patient holds her mouth wide open, the ear of the examiner held near the mouth and nostrils, still hears the sound, but indistinctly and as if coming from a distance.

Prof. H. M. Lyman made a careful auscultation of the mouth, side of throat, and region of the ears with me, and was positive that the origin of the sound appeared to be in the ears alone.

The external meatus presents no abnormal appearances. The membranæ tympanorum are thin and translucent, except in the central and upper portions, which are white and thick. The transparent portion of the membranes are moved by Valsalva's method of inflation and also very slightly *with each spasm of the pharyngeal muscles.*

From the condition of the patient's health, especially from the fact that she was possibly suffering from chorea, I was induced to prescribe Fowler's solution, cod-liver oil, quinine and iron, exercise in the open air, and rest from close confinement.

This treatment, continued and omitted from time to time for a year, improved the patient's general health without change in the special symptoms.

Meantime the patient at my request had been under the observation of Dr. E. F. Ingals, who had enjoyed an extensive experience in the practical use of the laryngoscope. He states that the mucous membrane of the throat is not noticeably congested. A thin muco-purulent fluid bathes the orifices of the Eustachian tubes. He further states that synchronous with the spasm and sound, the contraction of the levator veli palati and of the tensor palati molliis, respectively raises the velum and separates the labii of the Eustachian orifices.

There are, perhaps, three factors to be considered in discussing the cause of the sounds. 1st. The separation of the walls of the Eustachian tubes near their opening. 2d. The passage of air into the middle ear with each contraction of the pharyngeal muscles, and 3d, possibly most important, a spasmodic contraction of the tensor tympani.

I did not try any experiments to ascertain whether the

apparent pitch of the tuning-fork was modified during the spasms.

Such cases are quite rare, a few only being reported in works on otology and in otological journals.

In 1854 I had an opportunity to examine a most interesting case under the care of Prof. H. J. Bigelow, who had reported its history in the *Boston Medical and Surgical Journal*, November 3, 1847. In this patient, a young lady about 16 years of age, the sound, a sharp "click" audible across the room, appeared to come from the throat. I have been informed by Prof. Bigelow that this patient and another similarly affected, which subsequently fell under his observation, finally recovered. Unfortunately when these patients were under observation, the rhinoscope was practically unknown. There were possible cases, in which the spasms of the pharyngeal muscles were not attended with a synchronous spasm of the muscle in the middle ear.



FOUR CASES OF INTRACRANIAL DISEASE  
CAUSED BY CHRONIC SUPPURATION  
OF THE MIDDLE EAR.

TWO RECOVERIES AND TWO DEATHS.

BY CHARLES J. KIPP, OF NEWARK, N. J.

**M**Y object in bringing the following cases to the notice of the profession is twofold: First, to show that recovery from well marked intracranial disease supervening in chronic suppuration of the middle ear is not so rare an event as it is commonly supposed to be; secondly, to urge the use of the ophthalmoscope as an aid in the diagnosis of intracranial disease of this character.

I am well aware that the ophthalmoscope has been used for this purpose by many physicians for years past, but a glance at the cases of brain disease following purulent inflammation of the middle ear, published even within the last few years, will show that the practice is as yet very far from being general.

During the last two years I have made frequent ophthalmoscopic examinations of all my cases of acute and chronic suppuration of the ear, presenting symptoms of intracranial disorder, such as fever, severe headache, vertigo, nausea, vomiting, etc. The total number examined I am not now able to state, but it is certainly over fifty. Optic neuritis was present only in the four cases reported below; two of these recovered their health entirely, and the other two ended fatally. All the cases in which no optic neuritis was found, recovered from the suspected intracranial disease.

The following cases are mentioned in the order in which they came under observation:

1. *Chronic purulent inflammation of the middle ears. Meningitis. Double optic neuritis. Paralysis of the external rectus muscle of the right eye. Recovery.*

Florence H., æt. 5, a well developed, healthy looking child was sent to me by Dr. J. W. Corson of Orange, N. J., in November, 1876. From the child's parents I learned that up to a year ago the child had been in good health and free from ear disease of any kind. At that time she had an attack of tonsilitis which was followed by earache and discharge from both ears. During the past year she has had measles and a sharp attack of diphtheria. The otorrhœa and the deafness continued.

On examination I found nothing abnormal about auricle and mastoid process of the right ear. The external auditory canal was full of offensive pus, after the removal of which the walls of the bony portion were seen to be red and swollen. In the posterior half of the drum membrane was a large perforation, and the remnant of the membrana tympani and the exposed lining membrane of the promontory were covered with granulations. Air could be easily forced through the perforation by Politzer's method, and water injected into the ear escaped through the nose. The *left* ear was in about the same condition as the right. The ticking of a watch which is heard by the normal ear at one and a-half metre, was heard only when pressed against either ear. I applied with a cotton-holder a strong solution of the nitrate of silver to the granular surfaces, and ordered frequent and thorough syringing with warm salt water, and instillations of a one per cent. solution of sulphate of zinc. As the general health was good no constitutional treatment was advised.

Ten days later I saw the girl again. She was very irritable and complained of much pain in and about the right ear. I noticed at once that the integument of the right mastoid process was swollen and red, and that the swelling was greatest immediately behind and above the insertion of the auricle. No fluctuation could be detected. With the exception of considerable swelling of the posterior wall of the external canal, this, the drum membrane and the promontory were in about the condition described above. The Eustachian tube was permeable. The otorrhœa continued.

There was no change in the left ear.

I ordered two leeches to the swollen part, to be followed by poultices, and instillations of warm water into the right ear. The left one was treated as before.

Under this treatment the swelling of the mastoid and the posterior wall of the external canal subsided in about a week. In December the child passed through an attack of scarlatina which again brought on the earache, increased the otorrhœa, and left her in a very debilitated condition.

During the following three months the patient regained her former healthy appearance. The granulation which had again developed during the scarlatina, disappeared under the application of the nitrate of silver; the discharge gradually diminished in quantity, and the hearing was slowly improving. But in the early part of March she became feverish, restless and very fretful; she was delirious at times; complained of severe headache; was nauseated; vomited occasionally, and was constipated. At about the same time the walls of the right external canal became so much swollen that the drum membrane could not be seen, and the discharge from the ear ceased almost entirely. Some days later the parts anterior to the tragus began to swell, and in a short time the entire right side of the face was excessively œdematous. The integument of the swollen part was neither shining nor red. The lids of the right eye were so much swollen that it was difficult to open them, but the eyeball was not protruded or its mobility impaired in any direction. With the exception of slight pale chemosis, the anterior parts of the eye presented nothing abnormal. The interior of the eye could not be examined on account of the great intolerance of light. No fluctuation could be detected at any point in or near the swollen part, and a comparison of the jugular veins of the two sides failed to discover any difference in fulness. The integument of the mastoid was neither red nor swollen.

The left ear was entirely free from pain.

The treatment agreed upon by Dr. Corson and myself consisted in small doses of calomel, extract of hyoscyamus, and bromide of potassium. The instillation of warm water was continued, and the swollen part put up in cotton batting.

For about a week there was little change in the condition described; then the fever slowly passed away, the otorrhœa became again more copious, and the swelling of the face gradually subsided.

On March 23d the right external canal was again of normal calibre; the remains of the drum membrane was of a grayish color, and the lining membrane of the promontory, although still swollen, was much smoother than I had seen it at any time. The

left ear was almost dry. As the headache and vomiting continued, I made another attempt to view the interior of the eyes, and this time succeeded. I found both disks swelled but transparent, their margins indistinct and the retinal veins very full and tortuous. There were no white plaques on the disk or in the retina in either eye. Iodide of potassium was substituted for the calomel. During the month of April the ears remained in about the condition last described. The cerebral symptoms were at times better, at others worse; but they did not prevent the child from occasionally taking part in the amusements of its playmates. The optic disks continued to swell, and assumed a light grayish-red color. Their margins became entirely obliterated. The retinal arteries were of about normal size, but the veins were enlarged and very tortuous. No extravasation or white plaques could be seen on the disks or in the retina. Vision was apparently not impaired.

In the beginning of May the child's strength failed visibly, and in addition to the symptoms above enumerated she had also convergent strabismus (paresis of the external rectus muscle) of the right eye and very marked stiffness of the neck. The optic neuritis was at its height. There was no change in the condition of the ears.

With the exception of a diffuse swelling of the right side and the back of the neck, without redness, heat or fluctuation, which made its appearance in the latter part of May and continued for about two weeks, there was but little change in the child's condition during May and June. In July there was a marked improvement in all the symptoms. The child had regained sufficient strength to be out in the garden during the greater part of the day; had but little headache, and was free from attacks of vomiting. Her appetite was excellent. The squint disappeared entirely, and the optic neuritis was slowly subsiding.

During August there was a slight relapse of the head trouble which lasted for about two weeks.

In October the optic neuritis had completely disappeared. The optic disks were somewhat whiter than normal, and their margins were well enough defined. The retinal vessels were of about normal calibre. The ears remained in the condition described.

I last examined the child on January 7, 1879 (twenty-six months after she was first seen by me), and found her to be in excellent health.

There was still occasionally some discharge from the ears. In

both the remnant of the drum membrane was of a grayish color, and the handle of the malleus plainly visible. The lining membrane of the promontory was pale and smooth. With the right ear she could hear the watch at 8 cm. ( $H=\frac{8}{1\frac{5}{10}}$ ), and with the left at 5 cm. ( $H=\frac{5}{1\frac{5}{10}}$ ). All traces of the optic neuritis had disappeared. The optic disks and the retinae were normal in appearance. The sight was perfect ( $S=\frac{6}{6}$  in both).

No one will doubt, I think, that in the above case the headache, the fever, the vomiting, the squint and the double optic neuritis were caused by a meningitis at the base of the brain. It is also probable that thrombosis of the right lateral sinus and jugular vein was present at the same time, and caused the extensive œdema of the entire right side of the face, and the diffuse swelling of the right side and the back of the neck. The recovery from the intracranial disorder was as complete as it was unexpected, and should encourage us to take a more hopeful view of the termination of such cases than is usually done.

*II. Chronic purulent inflammation of the right middle ear. Central caries of the mastoid cells. Abscess of right middle lobe of brain. Thrombosis of right lateral sinus. Double optic neuritis. Death.*

Patrick F., æt. 23, a robust laborer, presented himself at the clinic of the Eye and Ear Infirmary of St. Michael's Hospital, on June 10, 1878, with the following history: Does not remember to have had ear trouble before a year ago. At that time he had severe earache which was soon followed by otorrhœa. Both passed away in a short time but have returned occasionally since then. Has never had syphilis.

A week ago he was suddenly taken with severe pain in right ear, and a few days later the pain extended over the entire right side of the head. The otorrhœa has been profuse since this attack began. Does not remember to have had a chill.

*Present condition.*—Patient has a very anxious expression and seems to suffer severe pain. He has no fever. Pulse 90. The right external ear and the parts around it are neither red, swollen, nor sensitive to pressure. The external canal is capacious and filled with pus, and the walls of the same are red but not swollen.

The drum membrane is of a bluish-red color, very much thickened and excoriated. In its lower anterior segment is a small perforation through which pus and air escape with difficulty on inflation of the middle ear. The ticking of a watch at 150 cm. normal hearing distance, is heard only when it is pressed against the auricle. Patient complains of severe pain in ear and head. Is not sick at stomach. The ophthalmoscopic examination shows the optic disks and the retinae to be normal.

The perforation was enlarged downwards, and he was ordered to syringe his ears with warm salt water, and to make frequent instillations of a warm one per cent. solution of sulphate of morphia.

*June 14th.*—Patient returned with the statement that the pain in his ear and head was no better. Condition of ear as before. Admitted to the hospital.

*June 15th.*—Headache very intense and constant. Movement of head increases pain. Marked stiffness of neck. No nausea or vomiting. Constipation. Pulse 96. Temperature in the evening 38.6 C. (101½ F.).

Profuse otorrhœa. Loud perforation noise on inflation. Ordered ice-bag to the head and administered 0.6 gram of calomel. At night he was given 0.02 gram of sulphate of morphia.

*June 16th, 10 A.M.*—Slept part of night. Bowels moved during night. Temperature early this morning 37.7 (100 F.). Had a chill an hour ago. Is now in a fever, and is vomiting. Headache excruciating. Mind perfectly clear. Margins of optic disks indistinct. Retinal veins very full. Otorrhœa profuse. No evidence of disease of mastoid cells. 8 P.M.—Vomited several times through the day. Took 0.02 gram of sulphate of morphia at noon. Headache is somewhat better. Is slightly drowsy. Pupils small and responsive to light. Appearance of fundus oculi as before. Pulse 106, soft and full. Temperature 39.4 (103 F.). Injected 0.015 gram morph. sulph. under skin.

*June 17th, 8 A.M.*—Had a tolerably good night. Vomited after breakfast. Has less headache. Temp. 38 (100½ F.). Skin cool. Pulse 80. Ear and eyes unchanged. 8 P.M.—Headache worse again. Mind quite clear. No vomiting since morning. Temp. 37.7 (100 F.). Pulse 80. Has great pain in ear. Otorrhœa very profuse. Perforation noise is loudly heard on inflation. Appearance of ear and eye about the same as before.

*June 18th, 8 A.M.*—Pain in head continues, notwithstanding large doses of sulph. morph. No vomiting. Temp. 38.5 (100½



F.). Pulse 80. 8 P.M.—No change. Temp. 37.7 (100 F.). Pulse 78.

*June 19th*, 8 A.M.—Headache continues. No vomiting. Temp. 36.9 (98.5 F.). Pulse 75. 8 P.M.—No change. Temp. 37.2 (99 F.). Pulse 75.

*June 20th*, 8 A.M.—Says that with exception of slight pain in right temple he feels quite well. No change in condition of ear. Temp. 37.2 (99 F.). 4 P.M. No change. Found him in lively conversation with a friend. Temp. 37.2 (99 F.). Optic disks swollen and retinal veins swollen and tortuous.

*June 21st*, 8 A.M.—Slept pretty well although his head pained him a good deal. Early in the morning he had a series of general convulsions, lasting half an hour altogether. Was unconscious. Eyes widely open and fixed. Foamed at the mouth. Is now very weak and apathetic. Ear and eyes as before. Temp. 38.3 (101 F.). Pulse 100. 8 P.M.—Since morning constant vomiting of a blackish fluid. Is slightly drowsy but answers questions promptly and rationally. Complains bitterly of pain in head. Has also tenesmus and pain in bowels. Tongue moist and not coated. Pupils of same size, small and active. Optic disks of grayish-red color and much swollen. Margins entirely obliterated. Vessels as before. No white plaques on disks or in retinae. Says that he sees as well as ever. Ear as before. Temp. 37.7 (100 F.). Pulse 100.

*June 22d.*—Headache unbearable. Vomiting has ceased. Pain in bowels and tenesmus have disappeared. Otherwise no change. Morning temp. 38.3 (101 F.). Evening temp. 38.8 (102 F.). Pulse 100.

*June 23d.*—No change. Morning temp. 39.4 (103 F.). Pulse 110. Evening temp. 38.3 (101 F.). Pulse 100.

*June 24th.*—No change. Morning temp. 37.7 (100 F.). Evening temp. 38.3 (101 F.). Pulse 90.

*July 2d.*—During the past week there has been but little change in his condition. The pain in the head has been continuous and exceedingly severe. There has been no return of the vomiting, and his bowels have been regular. He has had no pain in any other part of his body, and no paralysis of any part. His mental faculties have been unimpaired until to-day; now he is quite drowsy. The otorrhœa is still very copious. There is no change in his pupils and the optic disks remain as last noted. The temperature during the first days of the week was 37.7 (100

F.) in the morning, and rose to 38.3 (101 F.) in the evening. Since then it has varied between 36.9 (98.5 F.) and 37.2 (99 F.). The pulse was at no time below 75 or above 80. To-day the temp. is 37 (98.75 F.). Pulse 72, soft.

*July 3d.*—Stupor increased, otherwise no change. Temp. 37.2 (99 F.). Pulse 72.

*July 4th.*—Coma. Died at 6 P.M.

During the last two weeks of the patient's illness, the treatment consisted of the application of the ice-bag to the head, and of subcutaneous injection of large doses of the sulphate of morphia. The ear was very frequently syringed with warm salt water, and the middle ear was inflated at least once a day.

Autopsy 19 hours post mortem.—Only the head was examined in consequence of the advanced decomposition of the body. Dura mater of convexity normal in appearance. Longitudinal sinus filled with fluid blood. Pia mater of convexity hyperæmic. No fluid in subarachnoid space. On lifting brain out of skull a large quantity of very fetid pus escaped from under surface of right temporal lobe. On examining this part an abscess of the size of a hen's egg was found, separated from the dura mater only by a very thin layer of discolored brain substance. In the thinnest part of this layer was an irregular opening through which part of the pus had escaped. The abscess was not lined by a membrane, but the cerebral tissue surrounding it was of a dark color for a distance of about 5 mm., and somewhat firmer than the rest of the brain. No other lesion of the brain could be found. The ventricles contained about the usual quantity of serous fluid.

The dura mater over the tegmen tympani et antri mastoidei was of a light leaden color, but not thickened or ulcerated. There was no pus between the dura and the bone.

On removing the lateral sinus out of the sulcus a quantity of puriform fluid escaped, which was found to come out of a round opening, about 5 mm. in diameter, in the anterior and outer walls of the sinus. The hole was surrounded by softened tissue. The entire sinus was filled by an organized reddish thrombus, in the centre of which, corresponding to the deficiency in the wall, was a cavity containing puriform fluid. Above and below this puriform fluid, the thrombus was firmly adherent to the walls. The thrombus projected also a short distance into the internal jugular vein but was not adherent to the inner coat. There were no thrombi in the petrosal sinuses.

The temporal bone was removed, and examined after maceration in diluted alcohol for several weeks. The inner surface of the bone was perfectly smooth everywhere and of normal color except at tegmen tympani et antri, and in the sulcus lateralis where it was of a light bluish-red color. (Before maceration no discoloration of bone was apparent.) The discolored parts were no softer than those of normal color. The tegmen tympani et antri was of average thickness. The tympanic cavity contained pus. Its lining membrane was of a livid color, greatly swollen and studded with large granulations. In the lower anterior segment of the drum membrane were two perforations, each about 2 *mm.* in diameter, and separated by a narrow bridge. The ossicles were in normal position. The head of the malleus and the body of the incus were carious. The stirrup was entirely hidden by the swollen mucous membrane and was apparently normal, but almost immovable. No caries of the wall of the tympanum could be discovered. The antrum was rather small and its lining membrane was swollen and covered by offensive pus. The mastoid cells were rather small and filled with very fetid pus. The intercellular bony septa were carious in many places. The inner and outer lamellæ of the mastoid process were of healthy appearance and average thickness. The bony external canal was not carious.

The Fallopian canal with the facial nerve, the semicircular canals, the vestibule, the cochlea, and the internal auditory canal with its nerves appeared normal to the naked eye; they certainly contained no pus. The pyramid was carious in no part, but in a few circumscribed places it was of a reddish color.

In this case the existence of an abscess in the brain was inferred from the agonising pain in the head, the rigor, the convulsions and the double optic neuritis, but the phlebitis and thrombosis of the lateral sinus were not at all suspected. The entire absence of the usual symptoms of thrombosis of the sinus is certainly one of the remarkable features of this case. Another point of interest is, I think, the combination of abscess of the temporal lobe and phlebitis of the lateral sinus.

With regard to the channels through which the disease extended from the temporal bone to the brain and to the sinus, I am unable to give any positive information. But

as the inner surface of the temporal bone was at no place carious (although slightly discolored at the tegmen tympani and in the sigmoid sulcus after maceration), it seems probable that the inflammation extended along the vessels from the mastoid cells to the sinus, and from the middle ear to the brain.

From amongst the interesting features of the otitis may be named the continuance of the profuse otorrhœa till the very day of death, and the existence of caries of the central part of the mastoid process, without even the slightest œdema, pain or redness of the external covering of this process.

Had the patient fallen into competent hands at an earlier day, the otitis could probably have been arrested and the intracranial disorders prevented.

*III. Purulent inflammation of right middle ear. Abscess of mastoid cells. Abscess of back of neck. Meningitis. Double optic neuritis. Recovery.*

Mary O'R., æt. 16, a well-developed healthy-looking girl, was admitted into St. Michael's Hospital on October 28, 1878.

Ten years ago she had measles, followed by an otorrhœa which has continued to the present time. Was under treatment for a while, but as the improvement was not marked, stopped all treatment except syringing with warm water. In the latter part of September she had some pain behind the ear, and thinks it was caused by washing her hair, which was long and thick, and going to bed without thoroughly drying it. The pain continued to increase in severity for about two weeks. The treatment consisted of poultices and an application containing carbolic acid. About two weeks after the pain first commenced, noticed some swelling of mastoid region. The swelling extended, but nothing more was done for two weeks more, when she had a severe chill, followed by high fever and profuse perspiration. A physician was then called, who incised the swelling in its upper part and ordered a poultice to the same. After a few days another incision was made in the same region. As the treatment did not give the desired relief, she was brought to the hospital on October 28th. Dr. William Rankin, Jr., who had charge of the eye and ear department dur-

ing my absence from the city, saw the patient in the afternoon of that day, and found her greatly excited. Pulse 150. Skin hot and dry. The ear was discharging freely. The whole mastoid region was much swollen, hot, red and fluctuating. At the upper part was an opening from which a mass of granulations was protruding, and through which pus escaped on pressure. A large incision was made immediately posterior to the auricle, and the abscess evacuated. A drain-tube was inserted and a poultice applied. Frequent syringing of the ear and perfect quiet were ordered. Sulphate of morphine was given at bed time.

On the following day there was but little change in the patient's condition. The excitement continued. The ear and the wound discharged freely. No necrosed bone could be discovered. Her appetite was good and the bowels were regular. She was ordered to take 0.12 gram of sulphate of cinchonidia three times daily, and the stimulants which she had been taking freely, were discontinued.

Next day she was more quiet, but otherwise her condition was unchanged. In the evening the temperature was 38 (100.5 F.).

On the following day she was able to sit up in bed. An ophthalmoscopic examination was made and optic neuritis discovered in both eyes. The discharge from the ear and from the wound continued. Morning temp. 38.6 (101.5 F.). Evening temp. 39.15 (102.5 F.).

Three days later the patient was sufficiently well to entertain a number of friends who called on her, but in the evening she became very feverish and the temperature rose to 39.5 (103.25 F.).

Next morning the temperature had fallen to 38 (101.5 F.). A polypus was removed with the snare from the middle ear, and a quantity of fetid pus evacuated. Evening temp. 38.8 (102.5 F.).

During the next two days there was no change.

On the seventh day of November, I saw the patient for the first time. She was then suffering from intense mental excitement and was very feverish. The morning temp. was 39.4 (103 F.) She was complaining of pain in her ear and in the back of her head. There was profuse otorrhœa. On the posterior wall of the osseous external canal was a mass of granulations and in the membrana tympani a very large perforation. The lining membrane of the promontory was granular. Inflation by Politzer's method produced a loud perforation noise. The mastoid region was but little swollen. The incision made by Dr. Rankin was still open and dis-



charging. On examining the occipital region I found an immense abscess which extended a considerable distance down the back of the neck. This abscess was opened by a long incision and a large quantity of purulent fluid evacuated. No carious bone could be detected, and attempts to pass a probe from the abscess to the opening behind the ear failed. A large drain tube was inserted into the abscess, and a poultice applied over the whole swollen region.

Examination of the eyes revealed considerable swelling of the disks, obliteration of their margins, and marked fulness and tortuosity of the retinal veins. The disks were of a light grayish red color, but tolerably transparent. No white plaques or hemorrhages were found on the disks or in the retinae.

The patient had a good appetite, had no nausea or vomiting, and her bowels were regular. Evening temp. 38.8 (102.5 F.). The sulphate of cinchonidia was continued.

On the following day the temp. was 37.2 (99 F.) in the morning, and 39.15 (102.5 F) in the evening. There was a profuse discharge from the abscess in the back of the neck. The otorrhœa continued.

Next day she complained of pain in the right shoulder, which was found to be red and swollen; otherwise there was no marked change. Morning temp. 37.2 (99 F.) Evening temp. 39.4 (103 F.) The painful shoulder was wrapped up in cotton batting.

On the following day the swelling of the right shoulder had nearly passed away, and the shoulder was no longer painful on motion.

Two days later she had a severe chill followed by fever and sweating. No marked change in ear or eyes; abscess still discharging. On the following day the mastoid process was again somewhat swollen and painful. Otherwise her condition was unchanged. Reopened incision over mastoid and found a large fistula leading into antrum. At the same time I removed with the snare the mass of granulations from the posterior upper wall of the bony external canal. Water injected into the ear escaped freely through the fistula and also through the Eustachian tube. A piece of an elastic catheter was inserted into the fistula. The discharge from the abscess continued. Patient's general health was good.

Two days later the parts in front of the ear and the right tem-



ple became swollen, red and painful. No fluctuation could be discovered.

On the following day the tumefaction involved the lids of the right eye. There was no protrusion of the eyeball and its mobility was unimpaired. The swelling of the face continued to increase for two days, and then gradually passed away. Slight desquamation of cuticle followed.

The swelling of the optic disks was now at its height. Their surfaces were distinctly visible with a  $+4$  D glass, while at the maculæ luteæ the eyes were emetropic. The disks were of a reddish-gray color, but not very opaque. Innumerable small blood-vessels covered their surfaces.

The margins of the disks were completely hidden. No white plaques could be seen on the disks, but in the retina of the right eye, a short distance inwards of the papilla (upright image) was a whitish spot with ill-defined edges, and about one half the diameter of the disk in size. A retinal artery was distinctly visible on this spot. No extravasations could be seen in either retina. Vision was normal in both eyes.

From this time on the patient was free from fever. The abscess in the neck gradually filled up with granulations and then closed. After the removal of another polypus from the external canal, the otorrhœa rapidly diminished in quantity; the drain tube in the fistula of the mastoid process was then removed, and in a short time the wound was closed by a deep indrawn cicatrix. The swelling of the optic disks continued in a moderate degree at the time of her discharge from the hospital—seven weeks after her admission.

Since then she had attended the Infirmary at irregular intervals as an out-door patient. She was last seen on April 18th, nearly six months after she had come under observation, and was then in excellent health. There was no otorrhœa. The external canal was of normal appearance; the remnant of the drum membrane was of a grayish color, and the lining membrane of the promontory was pale. She could hear the ticking of a watch at 3 cm. ( $H = \frac{3}{10}$ ). The optic disks were of normal color and flat. The whitish spot in the retina had nearly disappeared and a few dots of pigment marked its former outline. The retinal veins were still rather full. Her vision was perfect, ( $S = \frac{6}{8}$ ).

Although several of the most common symptoms of men-

ingitis were absent, I did not hesitate in this case to make the diagnosis of meningitis at the base of the brain. Double optic neuritis is doubtless occasionally developed as a primary affection, but when it is accompanied by headache and fever, and occurs in an individual suffering from purulent inflammation of the middle ear and caries of the mastoid process, I think we can safely assume that it is the result of either meningitis, cerebritis, phlebitis or thrombosis of one or several of the cerebral sinuses. The large abscess which formed at the upper part of the back of the neck was probably the result of a periostitis which had extended from the temporal to the occipital bone. The tumefaction of the face was doubtless due to a mild form of erysipelas which started from the vicinity of the tragus. The inflammation of the right shoulder was so transient that its metastatic nature may well be doubted.

IV. *Chronic purulent inflammation of the middle ears. Meningitis. Thrombosis of later alsinus. Double optic neuritis. Death.*

Miss A. F., æt. 21, consulted me in August, 1874, with regard to deafness and otorrhœa. Disease began in infancy. Has never had much pain in ears. I found in the *right* ear a large perforation in lower half of drum membrane. This membrane was red and thickened, and the exposed end of the handle of the malleus resting against the promontory, the lining membrane of which was very smooth. The Eustachian tube of this side was pervious. Water injected into the ear escaped from the nose and mouth. There was but little otorrhœa from this ear. In the *left* ear there was a large perforation near the upper-anterior periphery of the drum membrane, and another smaller one near the lower periphery. The drum membrane was covered with granulations, and a large mass of granulations protruded through the upper perforation. After this mass of granulations had been removed by the snare, pus and air could be forced through both perforations by Politzer's method. From this ear the discharge was profuse. No exposed bone could be felt through the perforation. A two per cent. solution of nitrate of silver was injected into the middle ear through the perforation and the same solution applied to the

granular drum membrane. The patient was ordered to syringe the ears and to instill a one per cent. solution of sulphate of zinc.

A month later I saw the patient again. She reported improvement in amount of discharge. There was no change in the appearance of the ears. The treatment before mentioned was continued.

In October of the same year I had another visit from the patient, and found the ears in the same condition.

After that I did not see the patient again till December 21, 1878, five hours before her death and more than four years after her last visit to me.

On this occasion I saw her in consultation with Drs. Stæhlin and Sutphen, the attending physicians, to whom I am indebted for the following notes. Patient was first seen on evening of Dec. 10th. She was then suffering from very severe pain in both ears. The pain commenced three or four days before. She was feverish and complained of frequent chilly sensations. A cathartic, Quinine and the Bromide of Potassium were given; leeches were applied to the ears, and ice to the sides of the head.

Next day there was but little change in her condition. Short chills followed by fever and perspiration.

*Dec. 12th.*—Intense lancinating pain in head, proceeding from the ears. In *right* ear large dry perforation of drum-membrane. In *left* small perforation in inflamed drum-membrane, but little muco-purulent secretion in tympanum. Both ears readily inflated by Politzer's method. No evidence of disease of mastoid processes. Ophthalmoscopic examination shows retinal veins full and tortuous, but no other change. Temperature slightly raised above normal, but degree not taken. Ordered perfect rest in dark room. Large doses of sulphate of morphia.

Three hours later patient was free from pain, face flushed, skin hot and dry.

*Dec. 13th, A.M.*—Temp. 38.8 (102 F.). Pulse 90. *P.M.*—Temp. 39.95 (104 F.). Very little pain.

*Dec. 14th, A.M.*—Temp. 40.2 (104.5 F.). Pulse 80. Had slight pain last night. Was relieved by morphia. *P.M.*—Temp. 39.9 (104 F.). Pulse 106, soft. Has been sleeping some. Skin moist. Tongue coated. Pupils contracted and respond slowly to light. Bowels moved by cathartic. Acts stupid. Substituted hydrate of chloral for morphia. Ice bags to head. No local paralysis. No vomiting.

*Dec. 15th.*—Severe pain through forehead backwards, during night. Recourse had again to morphia with good effect, the Chloral failing to relieve the pain. 4 A.M.—Temp. 40.3 (105 F.). 9 A.M.—37.75 (100 F.). Pulse 85, soft. Condition about same as yesterday. Same treatment continued. 5 P.M.—Temp. 37.75 (100 F.) 9 P.M.—Temp. 37.5 (99.5 F.)

*December 16th.*—A.M. temp. 37.9 (100.25 F.). Pulse 80, soft. Continues stupid. Locates pain now in back of head. Left mastoid process is now somewhat swollen, red and tender on pressure. Made an incision through swollen tissue down to bone. No pus escaped.

*December 17th.*—Patient has had no pain; looks brighter; pupils less contracted. No discharge from incision. Temp. 39.15 (102.5 F.).

*December 18th.*—No change. Slept more last night. Senses acute. A.M. temp. 38.75 (102 F.). P.M. temp. 37.75 (100 F.).

*December 19th.*—Still apparently improving. Slight pain in side. Temp. 37.6 (99.75 F.).

*December 20th.*—Had a convulsion at 2 A. M. Since then she is delirious; sometimes violent. Seems to suffer from pain, but does not localise it. Throws arms about in an aimless manner. Picks at bedclothes. When aroused assumes a stupid stare, but immediately closes eyes again. Pupils dilated, contracting only slightly when exposed to light. No otorrhœa. No swelling of mastoid region. Passes urine and feces involuntarily. During last two days she has had several attacks of epistaxis. There is now marked optic neuritis in both eyes. A.M., temp. 39.9 (104 F.). Pulse 100. P.M. temp. 39.9 (104 F.). Pulse 104. No change otherwise.

*December 21st.*—Patient slept two or three hours last night. Recognized physician for a moment; then her mind wandered again. Temp. 38.8 (102 F.). Pulse 100. Skin dry and hot. Pupils dilated. Nose bled last night. Subsultus.

5 P.M., coma. Cheeks flushed. Skin dry. Temp. 39.9 (104 F.). Pulse 90. Sordes on teeth. Pupils dilated.

Well-marked optic neuritis in both eyes.

10 P. M., death.

No autopsy could be obtained.

Judging from the rapid growth of the granulations protruding through the upper perforation in the drum membrane, it

appears probable that the roof of the left tympanic cavity was carious more than four years before her death. Had she remained under treatment the disease could probably have been arrested. With regard to the precise nature of the intracranial disease, it seems most likely that it was a meningitis at the base, and phlebitis of the lateral sinus or the petrosal sinuses. The optic neuritis was not developed till a few days before death.

On looking over the literature of this subject, I have found but two cases of cerebral disease from otitis, in which optic neuritis is mentioned among the symptoms. Both cases recovered. They were observed by Allbutt, and are recorded in his book *On the Use of the Ophthalmoscope*, etc. Appendix. Cases. Nos. 42 and 43. I give them in full:

Rebecca R., æt. 10, was admitted under the author in August, 1867, and was a long time under notice. A few months before, when in excellent health, she had scarlet fever rather severely, and had a discharge from the right ear. On admission, the ear, as tested by watch, was deaf; the watch could scarcely be heard at one and a-half inch, which in a few weeks she was able to hear at eight inches. There were many symptoms of local meningitis at the base such as headache, sickness, strabismus (external) of right eye, etc., which I need not detail at length.

O. S.—Right disk very pink, vessels full, edges indistinct.

Left disk normal, or nearly so.

Reads No. 6 (Jäger) only with right eye. Reads No. 2 with left.

This child remained a long time under my care, and under the use of iodide of iron and cod-liver oil, with occasional use of chalk and mercury, she completely recovered. Her mental faculties, previously much weakened, were restored; her right disk cleared, and the right ear became sensitive to sound. She was threatened, however, with pulmonary symptoms when she was discharged on the family removing elsewhere.

G. H., æt. 11. Scarlet fever at æt. 2, followed by discharge from ear, which still continues (July 2, 1867). Eight years ago had "brain fever," said by the doctor to be due to the otorrhœa. He is decidedly deaf. At present suffers from symptoms of meningitis; is at times strange and almost maniacal in manner; has attacks of intense headache, nausea, occasional vomiting, convul-

sive attacks, intolerance of light, transient debility of limbs, inability for mental work. These symptoms vary a good deal in frequency and intensity; sometimes is free for several weeks, when he will suddenly run into the house with a violent access of headache. Is always best when ears are discharging freely; they discharge most freely when the boy is warm. The whole neighborhood of the left ear is puffy and tender, especially behind the pinna. In both disks is well-marked ischæmia. The bright œdematous disks stand out steeply, and the vessels ride over them, and the veins are full and dark.

*September 17th.*—Has been treated with iodide of potassium, cod-liver oil, and small doses of corrosive sublimate. Is better. Has had one fit with unconsciousness. Has still morning nausea. The disks have receded, leaving a more plain surface; their edges are undistinguishable; the vessels are large and dark, and there is still some œdema.

*October 15th.*—Much as before. Disks flatter and less œdematous.

*December 24th.*—On the whole much better. Disks as at last report. Yesterday, however, had intense pain in head; screamed and rolled on the floor. Has lately been taking syrup of iodide of iron and cod-liver oil.

*December 31, 1869.*—Has recovered a good deal from his head symptoms, and his ears are much less troublesome. There is now but little discharge. The edges of the right disks have cleared all round, except quite at inner edge. The left disk is indistinguishable, but the vessels are not distended. Sight in both eyes good, and always has been. Has a cough, and then an evidence of degeneration at both apices.

Both of these cases are of much interest, not only as instances of recovery from meningitis, but also as illustrations of the fact that tuberculosis not unfrequently follows long-continued purulent inflammation of the middle ear.

Besides these two cases of Allbutt's, I have found the record of a case of otitis media purulenta, in which optic neuritis was present, by Wreden, in *Archives of Ophthalmology and Otology*, vol. v, no. 1, page 75. But in this case the intracranial disease was not caused by the otitis, but by a neoplasm originating in the nasal cavity.



## CONDYLOMATA OF BOTH EXTERNAL EAR CANALS.

By H. KNAPP.

THE manifestations of syphilis in the organ of hearing have of late received more attention than in former years. Among the syphilitic affections of the outer ear, condylomatous formations have rarely been described, and, to judge from my own experience, do not frequently fall under the notice of the aural surgeon, for among from 9,000 to 10,000 cases of ear disease, I have seen only one example of them. *Wilde*\* reports one case, adding that it is a rare form of disease. "A female, aged 25, suffers from deafness, tinnitus, occasional pain, foetid and sometimes bloody discharge from her left ear, for eight months. The internal meatus is completely closed by several condylomata which grow around its margin, but particularly from its lower edge. They are rather sensitive to the touch, lobulated on their surface, project beyond the margin of the aperture, and are a little more florid in color than the natural skin. When the tragus is pressed backward, a muco-purulent discharge exudes between these growths. The excrescences were touched with nitrate of silver, after which a poultice was applied. The subsequent treatment consisted in washing over the morbid growths with a strong solution of nitrate of silver every second or third day, and, in the intermediate time, keeping a dossil of fine lint wet with diluted liquor plumbi

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\* Pract. Obs. on Aural Surgery. Philadelphia reprint, 1853, page 202.

applied to the concha; besides the internal administration of Plummer's pills and sarsaparilla. By persisting in this treatment for upward of two months, the condylomata disappeared, leaving the meatus natural, when the membr. tymp. was found unimpaired, and the hearing was restored."

This case is so well described that I have quoted it almost completely. Wilde mentions cold, not syphilis, as the cause. The patient "is otherwise healthy, and attributes her affection to cold." Nevertheless he treats her with Plummer's pills and sarsaparilla, and I am inclined to think that the condylomata in this case were of syphilitic origin.

The majority of modern text-books on aural surgery mention either nothing or very little of the disease under consideration. Von Tröltsch says\*: "Broad wet condylomata have repeatedly been met with in the external meatus of persons suffering from constitutional syphilis. The irritating secretion from them gradually produces different forms of inflammation and suppuration in the whole meatus."

A. Stöhr published in 1870, a paper† on the formation of broad condylomata in the external meatus. As resident assistant physician to the large hospital at Würzburg, he observed fourteen cases of broad condylomata in the ear canals of syphilitic patients, eleven of which were females. The disease occurred mostly on one side only, and in persons whose ear canals were narrow. It began in the depth of the meatus as red patches which developed into slight elevations (papulæ) and well marked condylomata. Their surface in most cases is exulcerated, and secretes a watery or a thin purulent discharge. They fill up the calibre of the ear canal, and in their growth may protrude beyond the external aperture. In one case only the condylomata occupied the edge of the outer orifice of the meatus. Pointed excrescences are rare. The hearing was always impaired. The pain was moderate in most cases, in two only it was violent for a few days. Complications with severe affections of the middle ear, and rupture of the drum membrane

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\* Lehrbuch v. Aufl. p. 103, 1873.

† Arch f. Ohrenh. v. p. 130-137.

are not mentioned. The condylomata were cured in the course of one or several months. Relapses were noticed in three cases, together with relapses of other symptoms of syphilis, about six weeks after the apparent cure of the affection. All patients regained good hearing. Mild cases were cured by constitutional treatment alone, severe cases required local treatment additionally, namely, abscission of the prominent excrescences, cautious touching of the deeper ones with nitrate of silver in substance, and most careful cleansing with weak solution of acetate of zinc and hypermanganate of potash.

In the case which came under my own notice, the disease was so marked in all its features that an account of it will not be devoid of interest.

Mrs. H. Sh., æt. 38 years, of New York, had an eruption on her head, and discharge from her left ear when she was 10 years old. She recovered from it and enjoyed good health and perfect hearing until six months ago, when she contracted syphilis. Four months ago an eruption broke out all over her body, her throat became sore, her hair fell, the lymphatic glands were swollen, she lost strength, and her complexion grew pale and sallow. When her throat began to trouble her, she had an earache every now and then, but could hear well. At the same time there appeared in both external auditory canals small reddish pimples which increased in size and number so that in about four weeks they filled the canals and protruded outward. There was moderate, thin discharge from the ears, and considerable impairment of hearing. The discharge ceased occasionally, and at those times the ears pained her. This condition remained essentially the same until she presented herself at the New York Ophthalmic and Aural Institute, on September 20, 1878, when I found *both ear canals completely filled, and the external orifice of both meatus and the adjacent parts of the conchæ occupied all around by reddish, wart-like excrescences resembling the syphilitic condylomatous growths so often seen at the anus.* Some of them were ulcerated at their apices, and discharged a thin, watery fluid. By pulling the auricles back, the calibre of the auditory canals slightly opened. There was no tenderness on pressure in the mastoid region, the hearing was moderately good ( $h=\frac{1}{24}$ ;  $v=\frac{30}{80}$ ).

A papulous syphilide covered the whole body, and was very marked on the forehead. In the soft palate there were ulcers with unclean bottom and raised uneven edges. The glands of the neck were swollen, and the patient was very pale and weak.

The syphilitic nature of the affection being evident, I ordered the patient to take 0.03 of calomel with 0.006 of opium, three times daily, besides twice daily an inunction of 4.00 of mercurial ointment successively into different parts of the body; further, a gargle of chlorate of potash. The ear was syringed from four to six times daily with lukewarm water, after which the meatus was carefully wiped and dried, and calomel powder dusted on the excrescences. A part of the excrescences at the orifice of the right meatus was cut away with the scissors. No reaction followed, but the remainder of the ear canal recovered as well and almost in the same time as the part from which the excrescences had been removed. Under the above treatment the excrescences grew steadily smaller, and in the course of two months disappeared, leaving no trace. During the first weeks of the treatment, however, there was an aggravation of the affection in the pharynx. She suffered intense pain in her ears, and was relieved when profuse purulent discharge from both ears set in. The walls of the ear canals were so much swollen that no speculum could be introduced, yet the characteristic whistling sound on inflation showed that both drumheads were broken. The ears were inflated every day or every other day, and the former local treatment was continued. The general treatment, however, had to be discontinued for a short time, on account of mild salivation. The purulent discharge lasted about four weeks, at the end of which the excrescences and the swelling of the walls of the canals had been so much reduced that the bottom of the meatus could be examined with a speculum. The lower parts of both drumheads were perforated, the upper parts whitish, moist and swollen,—purulent infiltration.

From that time there was a regular progress in the improvement of the patient. The swelling and congestion of the pharynx diminished, the raised edges of the ulcers flattened down, their bottom cleared up, and the whole affection of the pharynx disappeared in the course of three months, without leaving any traces. The whitish discoloration of the softened drumhead was replaced by a dull red color. The thickened membrane was evenly stretched across the canal, showing a hole below the umbo, with sharp

edges. The depth of the drum cavity was restored, its mucous membrane red, but not appreciably swollen. There was no otorrhœa. The adjacent parts of the ear canal were still red and slightly swollen; the condylomata had all disappeared. The holes in the drumhead grew steadily smaller, and closed in about two months after the perforation.

When I examined the patient for the last time, February 20, 1879, her pharynx was completely cured, both ear-canals were clean and normal in every respect; the drum membranes were entire, whitish, their details well expressed; the reflexes dull. The hearing power for noises was still diminished; that for speech fully restored, namely:

$h R = \frac{3}{24}''$ ,  $L = \frac{6}{24}''$

Politzer's acoumeter  $R$  3',  $L$  4'.

$= \frac{2}{3} \frac{0}{0}'$ , on both sides.

Bone conduction normal.

The general health of the patient was improving, and the mercurials were replaced by tonics.

From the whole history of the disease, it seems to follow that the extensive manifestations of secondary syphilis in different parts of the body were accompanied throughout the extent of both ear canals by the eruption of papulæ, which ulcerated (broad condylomata) and secreted a thin fluid. On the aperture of the canal and the adjacent part of the concha, the growth of the papulæ was interfered with neither by mutual compression nor by the secretion, which, running down the ear, left the margin, except on the lower part, dry and clean, and in a favorable condition for the unimpeded development of the condylomatous excrescences. In this manner the outer end of each ear canal surrounded itself with a wall of dry, spherical and conical, wart-like elevations, like a neckfrill.

The *ear disease* was, no doubt, a *serious* one. Apart from the peculiar affection of the outer ear, there was severe purulent inflammation of both middle ears, with perforation of the drumheads in a patient suffering severely from syphilis.

The complete recovery of the patient may serve as a precedent for forming a favorable *prognosis* in similar cases.

The *treatment* adopted in this case has answered the purpose, and seems appropriate. It consisted in mercurials, chlorate of potash gargles, cleansing of the ear by syringing, washing the meatus with a one per cent. solution of nitrate of silver, dusting the excrescences with calomel powder, and inflating the middle ear.



A CASE OF TUMOR OF THE AUDITORY NERVE  
OCCUPYING THE FOSSA FOR THE CERE-  
BELLUM.

By GEO. T. STEVENS, M. D., OF ALBANY, N. Y.

On December 27, 1878, Emma B. was brought to me by her physician with the view of having an operation for the relief of strabismus. The girl was seventeen years of age, of rather stout build and with thick dark skin. Her movements were heavy, her words dragged, and there was an evident want of intellectual activity. The eyes were affected by a very marked convergent squint, but I was informed by the Doctor that until she was about six years of age she had had divergent strabismus, and that several years ago the eyes began to turn inward. There was at the time of this interview a convergence of about five lines. Upon a more careful inspection of the organs, it was seen that there was paralysis of the external rectus muscle of each eye. The girl was able to carry the centre of the pupil of the right eye outward about two millimetres and the left about four millimetres beyond the median line. Her sight was found to be  $\frac{2}{10}$  in each eye. The pupils were large and sluggish. Her hearing was lost in the left ear, and very imperfect in the right. Examined by the ophthalmoscope, both eyes exhibited the well marked choked disk which often characterizes inter-cranial pressure. There was moderate tumefaction of the disk which was distinctly striated, the veins of the retina were dilated and tortuous and the arteries attenuated. I learned that she was subject to headache in frontal and occipital region, and that at the present time there was a sense of unusual heaviness of the right arm and leg. The doctor also informed me that her friends had observed during the past four years there had been a diminution of mental activity, which they described by

saying that she was "growing childish." Notwithstanding this she was an apt scholar, and regarded as a bright girl. Her memory was good; she had been able to maintain an excellent standing in her classes at school until she was fifteen, but in her fifteenth year had fallen behind her class, and had not been able to pass examination for the high school with her companions. I learned that at the age of thirteen or fourteen she ceased to mature, and her mind and habits reverted to the condition of childhood. She preferred the company of very young children, and enjoyed playing with dolls and other childish amusements. This liking for the amusements of early childhood had grown steadily upon her.

The deafness in the left ear had been known about a year, but upon close inquiry it seems probable that it had existed much longer.

Two years before her visit, her father had observed, when she was walking with him, that her gait was unsteady, and he had reprimanded her for it. Afterward her mother had noticed that she was unable to direct her steps upon a plank walk about three feet wide, but would go off on one or the other side; and a year ago a friend had laughed at her on account of her awkward gait. Her mother described it "as one would walk whose shoes were too tight." In walking through a door she would often come in contact with one side of it. She was able to work with her needle without difficulty up to the time of the examination, and had recently executed some articles of fancy work, which she had done as actively and as dexterously as girls of her age and condition are wont to do.

Having learned the principal facts above related, I informed the Doctor that the case was not one for operative interference; that there was serious mischief at the base of the brain, and that the probable cause of trouble was a tumor at the base of its left hemisphere; and further, that should this diagnosis prove correct, the case had now assumed an active stage, and that an early termination in death might be expected. I however advised that the most favorable view of the case be adopted, and that he apply leeches to the neck, and take other active measures to subdue the meningitis which probably existed. My suggestions were accepted, but the girl rapidly lost strength. In three days after her visit to me she found great difficulty in walking or standing, especially as her right side seemed powerless.

On the fourth day she was no longer able to sit up, and took

to her bed, which she was destined not to leave. She sunk gradually into a state of stupor, her speech becoming more and more hesitating and her intellect more clouded, until complete coma supervened, followed, a few hours later, by death, on January 26th, four weeks after the diagnosis and prognosis had been made, while she was in an apparent state of health, her condition having excited no unpleasant apprehensions on the part of her friends or her physician. During the last five days there had been total inability to move the right arm or leg, but no cramps or convulsions were present.

The *autopsy* twenty-two hours after death revealed, first the signs of recent and general meningitis, and on turning out the brain the suspected tumor was seen to occupy a large portion of the fossa for the cerebellum lying between it and the petrous portion of the temporal bone. The tumor occupied one half of the fossa, having crowded upon the cerebellum until the left hemisphere of that organ was but half the size of the other hemisphere. As the tumor was moved from its position it was seen that a cord or process from it was drawn from the very much enlarged opening representing the meatus auditorius internus, and that this thick cord or process evidently occupied the position of the auditory nerve. Other nervous bands attached to the surface of the tumor, were by its gravity broken before their course was determined. No other portion of the brain or cavity of the cranium exhibited any feature of interest except the signs of recent meningitis already mentioned. Only the tumor and a portion of the petrous bone were preserved. The latter at once attracts attention by the unusual size of the meatus auditorius internus. The tumor is in its general form nearly spherical but irregular and nodulated. Its diameter is about two inches and its weight one and a-half ounce. It has a dirty skin color, is firm to the touch and has upon its surface numerous vessels and nerves. A large cord or process on one side was drawn from the meatus auditorius internus, and is undoubtedly the remains of the auditory nerve.

If this supposition is correct the tumor is in or upon that nerve. A section through the tumor shows a firm solid

mass, the cortical portion having a light gray color, while the inner portion is of a yellowish red. Microscopical examination shows the structure to be composed of fibrous and connective tissue with groups of spindle-shaped nucleated cells.

From the position in which the tumor was found, from the fact that the large cord which is seen on one side occupied the position of the auditory nerve in the meatus auditorius internus, and that almost directly opposite the cord is the broken extremity of another nervous cord less in size, and from the nature of the tumor itself we are justified in regarding the body as a sarcoma of the auditory nerve. This being the case, there are many points of interest connected with it.

First, independently of the variety of the tumor, it is a fact of much interest that such a growth should intrude upon the space allotted to the brain, and while crowding upon that organ during perhaps many years cause so little disturbance of the functions as that its presence should not be suspected. There were evidences in this case that the growth had existed for several years.

Another point of general interest is that while the patient is in apparently good health such a tumor may be suspected and even its location approximately determined, as was done in this instance. In respect to the nature of the tumor and its physiological bearings there are also points of much interest. The fact that notwithstanding the pressure upon the cerebellum which had caused a diminution of one half in size of one of its hemispheres, no defect of muscular coördination had been observed, except the circumstances of her unsteady gait, and her tendency to run against the side of a door when attempting to pass through. The first of these circumstances might possibly and the latter probably be accounted for by the paralysis of the ocular muscles. Another interesting fact is the entire absence, even to the last, of facial paralysis, which might be expected from the pressure upon the nerve of such a body, especially as the tumor followed the facial nerve into the meatus auditorius internus. The last circumstance seems to be accounted for by the fact

that grooves upon the surface of the growth allowed the nerves to pass beneath it, secured against any unusual pressure.

Dr. H. Knapp, who examined the tumor with the microscope, described it as follows :

"The tumor, hardened in alcohol, is irregularly round and measures 45 *mm.* in length, 40 *mm.* in breadth, and 36 *mm.* in depth. Its uneven surface is covered with a thin fibrous capsule which, when drawn off and placed under the microscope, exhibits a very dense network of delicate connective tissue fibres, interspersed with small round cells. The surface is traversed by numerous large and tortuous veins, and by many nerves which originate in an appendix or process of the tumor, pass in a radiating direction over its surface, and show no peculiar features either to the naked eye or under the microscope.

Immediately under the thin capsule of the pseudoplasm, there is a fibrous-looking tissue which can be torn off only in small irregular fragments, and under the microscope discovers a dense accumulation of regular spindle-shaped cells with longer or shorter offsets and distinct, oval, coarsely granulated nuclei. Sections passing through the tumor in different directions, show a dense fibrous structure throughout, with an irregular, rather fine striation. Microscopic specimens taken from all parts of the tumor, except from the vicinity of the above-mentioned appendix, show the same uniform structure as seen in the small pieces torn from the periphery of the tumor. The densely crowded fusiform cells are arranged in tracts which intersect one another at smaller or larger angles. Teazed preparations as well as very thin sections stained with carmine, logwood, and methylgreen, of which Dr. Born made a great many and very beautiful ones, demonstrated that the fibrous-looking tracts consisted exclusively of spindle-shaped cells. Many thin-walled well-filled blood-vessels pervaded the tumor, and extravasations of blood into its substance were seen here and there. Also a certain number of hyaline, colloid-looking corpuscles were, in some places, scattered through the tissue of the pseudoplasm.

The above described appendix or process of the tumor, which had entered the greatly dilated internal ear-canal, showed under the microscope the normal structure of a nerve. It was the acoustic. From it the nerve fibres could be followed a certain distance, 4 to 6 *mm.*, into the substance of the tumor. They were grouped in smaller or larger bundles which passed radiating between the tracts of the fusiform cells, among which they disappeared. I have not been able to see a larger portion of the nerve fibres pass like a cord on one side through the periphery of the tumor, nor have I detected any fibrous or myxomatous tissue in the pseudoplasm—conditions which are frequent in tumors of the optic nerve. The nerve fibres entered the growth in a radiating direction, were soon lost in it, and not collected again at the other end; as we commonly find in tumors of the optic nerve.

The result of the examination is that at the peripheral end of the acoustic nerve a large spindle-celled sarcoma developed the connection of which with the central end of the nerve could not be discovered.

I did not attempt to make a microscopic examination of the labyrinth, such as A. Böttcher and S. Moos have done in similar cases (*ARCH. OPHTHAL. AND OTOL.* iii. 1. page 134, and iv. 483), since for such an examination the specimen was not well enough preserved.



## A NEW TEST FOR SIMULATED ONE-SIDED DEAFNESS.

By DAVID COGGIN, M.D., OF SALEM, MASS.

IN 1876 the writer was asked to testify in a medico-legal case, as to the presence of deafness in the plaintiff, a man of 42 years. Being alone at the time of examining him, it occurred to me that Camman's bin-aural stethoscope might be of help in the absence of the assistants necessary for the employment of Müller's and other ingenious tests for malingering. As the patient claimed to be deaf in his left ear, I inserted a tightly fitting wooden plug in the rubber tube that entered the right metal socket of the stethoscope, and then adjusted the two tubes to the sockets. On trying it I found I could not distinguish spoken words with my right ear. Asking the patient to put on the stethoscope, he readily repeated after me the words I whispered and spoke in the thoracic cup, which served as a mouth-piece.

The tube containing the plug was then removed, and the tragus was firmly pressed against the meatus so as to completely close it.

Then, on again speaking in the mouth-piece, the tube being applied to the left ear, as before, the patient positively denied that he could distinguish what I said to him. Of course he was aware that the tube through which he supposed he had heard before, was no longer in his right ear.

Believing this simple test for simulated one-sided deafness to be a new one, I venture to transmit it to the ARCHIVES, though not over confident as to its accuracy and utility.

June, 1879.

## NOTE ON THE TREATMENT OF ACUTE SUP- PURATION OF THE MIDDLE EAR.

BY DR. EDWARD T. ELY, NEW YORK.

THE tendency to spontaneous recovery, manifested by so many acute diseases, is observable also in acute suppuration of the middle ear. Probably this is not a new thought to any reader of this paper, but it seems to the writer to be too much ignored in practice. Great labor has been required to lead physicians and laymen to consider acute suppuration of the middle ear as of any importance. This work has involved much writing and discussion as to the nature of the disease, and as to the necessity for prompt and efficient treatment of it. It is natural that many practitioners, having thus been laboriously awakened to its importance, should hold exaggerated ideas as to the remedies required for its cure.

Notwithstanding the efforts which have been made to bring patients with acute aural disease under treatment, the majority of them continue to be neglected by themselves and by their family physicians. The numerous cases of acute suppuration of the middle ear which have recovered, and which are constantly recovering, in spite of neglect or of bad treatment, afford proof of a tendency to self-limitation in the disease. Every aurist sees many patients who, in stating their history, refer to former suppurations of the drum which have ceased spontaneously. The drumhead is found to be well healed, although it may present extensive cicatrices, and the hearing is either perfect or only slightly

impaired. It cannot be denied that many of these patients have fared as well as if they had been under the most skillful management.

Admitting these facts, should they not influence our practice somewhat? It is not intended here to underrate the importance of having every case of this disease under the observation of a competent surgeon from the outset. Nor is it designed to make any argument against the greater part of the treatment usually employed, but simply against the use of astringents or caustics before they are certainly indicated. We are assuming that the pain and congestion of the first stage have been subdued and that we have to deal only with a perforated drumhead and a suppurating tympanic cavity. Under these circumstances, would it not be preferable, in every case, merely to keep the ear clean and to watch it for a few days, to see what it is disposed to do for itself, before resorting to any more active treatment? It will surprise a person who has never done this, to find how often the drumhead will heal and the disease be cured before this watching-process is finished. The application of an astringent or caustic is certainly needless in many instances. The use of them, moreover, has certain disadvantages. If, in such a condition as we are considering, the surgeon immediately applies them, he complicates the problem before him. If the ear does not happen to do well, he is at a loss to know how far this is due to the disease, how far to erroneous treatment. Any person who has treated a severe case of purulent ophthalmia, threatening destruction of the eye, knows how embarrassing our uncertainty as to the choice of remedies may become. If, on the contrary, a suppurating tympanic cavity has been watched long enough to determine its natural tendency, any needed remedy can be adapted to it with far more accuracy. The choice of even such mild remedies as our weakest solutions of zinc or alum is not a matter of indifference. We have all seen cases where they seemed to increase the swelling, or the discharge, or the loss of tissue. The following one seems to show a still more serious effect:

Miss H., aged 20, consulted me November 30, 1877, with acute suppuration of her left middle ear of ten days duration. There was a free discharge of pus, and no pain or swelling. I ordered syringing of the ear, and the instillation of a two grain solution of sulphate of zinc twice daily. Immediately after using the zinc drops she began to have violent pain in the ear. This pain continued all night, and, when I saw her the next day, the auditory canal was so swollen that the drum could not be seen; the whole of that side of the face was swollen and tender, and there was congestion and pain in the eyeball. There was a temperature of  $101^{\circ}$  and some vertigo. Leeches, hot water, morphine, and rest in bed were prescribed. The pain, swelling and vertigo did not disappear until the evening of December 4th. I always attributed this attack to the effect of the zinc, although I have no further proof of the fact than the patient's own belief of it, and the history of the case.

The following cases are offered in illustration of what has been said above. Only a few are given out of a larger number which might have been presented had it been thought essential to the argument:

I. Susie M., aged 6, came on November 11th with a history of pain in her left ear from six o'clock until eleven of the previous evening. The drumhead was found congested and ruptured, and there was a purulent discharge. Syringing of the ear with warm water twice a day was ordered. On the 14th there was no discharge, and the perforation seemed to be healing; the syringing was discontinued. On the 16th the perforation had healed and the hearing was fully restored.

II. Miss J. H., aged 21, came on March 11th, having had severe pain in her left ear since 3 A. M. The drumhead was found ruptured, and there was purulent discharge. The hearing on that side was  $\frac{6}{40}$ . Leeches and the hot douche were ordered, and they seemed to arrest the pain at once. After that, the ear was simply syringed occasionally with warm water. On the 13th the perforation was nearly closed. On the 18th it was completely healed, and the hearing was  $\frac{40}{40}$ .

III. Mrs. M., aged 35, came on March 17th, saying that she had had a cold in her head for the past week; that two or three days ago, while blowing her nose, she had felt a "cracking" in her right ear, and that since then there had been a dis-

charge from the ear. [Before this trouble the drumhead on that side was cicatricial from a suppuration in childhood.] A large perforation was found in the posterior part of the drumhead, with a muco-purulent discharge. The hearing was  $\frac{6}{40}$ . Syringing with warm water, two or three times a day, was ordered. On March 19th the perforation was much smaller; the discharge was still abundant. On March 20th there was no discharge. The next day her cold became worse, and she had some fever. The following three days she had throbbing and tinnitus in the right ear with reappearance of the discharge; also had some vertigo. Was taking quinine during this time. On the 25th the discharge had ceased, and a few days later the perforation was healed. Hearing  $\frac{6}{40}$ .

IV. Mr. W., aged 40, came on February 24th with a broken drumhead and acute suppuration in the right middle ear. The discharge had appeared on the 19th, after eight hours of pain in the ear. Syringing with warm water was prescribed. On February 27th the discharge was found to be less. On March 2d the discharge had ceased and the perforation was very small. A few days later the drumhead was found to be healed and the hearing restored.

V. Master L., aged 5, came June 17th with a history of ear-aches, both sides, for the previous four weeks. An examination showed perforation of both drumheads and acute suppuration of the middle ears. No treatment was employed except syringing with warm water. The patient made a perfect recovery.

VI. Master F., aged 14, came on April 7th with acute suppuration of the left middle ear. The use of the warm douche was prescribed. On April 17th the ear was doing well, and the hearing was  $\frac{12}{40}$ . A few days after this the patient was cured.

In this case and the preceding one the exact date of recovery was unfortunately not recorded.

VII. Miss M., aged 18, came on December 14th with acute suppuration of the right middle ear, of a few days' duration. She had already had a chronic suppuration of that ear, following measles, which had been checked, without restoration of the drumhead. Warm syringing was prescribed. On January 11th the discharge was found to have ceased.

VIII. Master V., aged 16, came on June 20th with an acute suppuration of the left middle ear. The discharge, which was very bloody, had been noticed by the patient a day or two previously, after a night of very severe pain in the ear. There had already been marked deafness on both sides, from chronic catarrh, for many years. The only treatment prescribed was syringing of the ear with warm water two or three times a day. On June 27th the drumhead was found to be healed. There had been no discharge for several days.

The cases given above are thought to be sufficient in number and variety for the purposes of this paper. The local treatment in all consisted simply in syringing the ear with warm water as often as seemed advisable. Of course the throat and the general health received attention when it seemed needed. It is believed by the writer that treatment as simple as this is sufficient for many cases of acute suppuration of the middle ear, and that it is usually well to make a trial of it for a few days before resorting to anything more energetic.

Several of the cases here presented are from the practice of Dr. D. B. St. John Roosa, to whom I am indebted for the use of them.



ABSTRACT OF AMERICAN OTOLOGICAL LITERATURE FOR THE FIRST QUARTER OF 1879.\*

BY SWAN M. BURNETT, WASHINGTON, D. C.

*1. Perforating wounds and injuries of the membrana tympani. Dr. C. S. Turnbull. Reported by Dr. C. E. Sajous, Med. and Surg. Reporter, Philadelphia, Feb. 22d.*

In this paper there are the reports of three cases :

CASE I.—*Traumatic perforation of the membrana tympani, with fracture of the handle of the malleus.*

A teamster aged 19, had a pen-handle thrust in the ear by a mischievous boy. This was followed by slight hemorrhage, a little pain and some dizziness. An apothecary instilled some nitrate of silver which was followed by inflammation which extended to the drum cavity. *M. T.* macerated so that no details could be made out. Treated by instillations of warm solutions of salt and water and the use of Politzer's bag tri-weekly, and Tr. Iodine over mastoid. On subsidence of the inflammation, the handle of the malleus was found to be broken a short distance from the umbo. The fracture united, but not in proper opposition, the lower end riding over the upper portion of the handle. There were two triangular light spots, one from the umbo, the other from the broken end of the malleus handle.

CASE II.—*Perforation from a thrust of a pencil.*

In a fortnight healed with normal hearing power.

CASE III.—*Foreign body (bug) removed from the ear after having remained three years.*

A large bug crept into the ear of a man aged 52, on a summer night. Great pain and distress until the wife poured oil in and drowned the bug. Six months after, increasing deafness and tinnitus, which continued until seen by Dr. T., who removed by syringing a well-preserved coleopteran with its mandibles fixed in

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\* This abstract is made from general medical journals only. The papers of the special journals—Transactions Am. Otol. Soc., and Amer. Jour. of Otol.,—will be reviewed in the systematic reports.—EDITORS.

the dermoid layer of the *M. T.* which came away as an exfoliation.

2. *A case of mastoid disease.* Chas. P. Knapp. *Philadelphia Med. Times, Feb. 15th.*

A woman 23 years of age, had more or less earache since September, 1877. In June, 1878, there was perforation of the drum-head; ordered a blister over the mastoid. On July 4th there was a purulent discharge from the ear and pain and swelling over the mastoid. Perforation of the mastoid cells was resorted to, and 3 ji of pus evacuated. Bone found denuded of periosteum and soft. Wound closed and had to be reopened, but a successful result was finally obtained. Watch heard at 8 inches.

3. *Fibroid tumor of the ear.* Robt. C. Finley, M. D., *Philadelphia Med. Times, Feb. 1, 1879.*

A colored girl of 12, had a tumor on the lobe of each ear standing out at right angles from the posterior surface. One was  $1\frac{1}{4}$  inches in length,  $\frac{1}{2}$  inch at its base and  $\frac{3}{8}$  inches at its free end; the other smaller. Ears pierced three years before. Removed.

4. *A modification of Wilde-Blake's Aural polypus snare by Dr. C. H. Burnett, Philadelphia Med. Times, Jan. 15th.*

Dr. Burnett's modification of Dr. Blake's modification of Wilde's snare is to have the canula through which the wires pass much reduced in size, its outside measurement being only 1 mm. It is made of steel, but he suggested that it might be made of virgin silver. The wire for use in this small canula must of course be very fine, and he has found fine brass piano-wire very satisfactory.

5. *Fistulous caries of the mastoid complicated with temporal subperiosteal abscess and cranial abscess.—Cure.—N. J. Martinache, M.D. —Western Lancet, March.*

A man, 55 years of age, of strong constitution, saw Dr. M. on August 10, 1877. Fourteen months before he had purulent inflammation of the left ear. When Dr. M. saw him he was still suffering from this purulent inflammation; there was a perforation of the *M. T.*, mastoid red and swollen. There was a fistulous opening in the latter through which a probe passed from below, forward and inward for two inches. Pus escaped through the auditory canal more abundantly than through the opening. This fistula was first enlarged by means of a gouge and afterwards by a trephine, but with no improvement. On December 20th, a temporal subperiosteal abscess formed, which was opened. On January 20th, violent pains in head and occasional vertigo. It was then determined to remove all the diseased bone, and for this purpose

a vertical incision was made  $3\frac{1}{2}$  inches in length, reaching from the upper level of the concha to the apex of the mastoid. All the diseased bone was then removed, leaving a cavity  $2\frac{1}{4}$  inches by  $\frac{1}{2}$  inch wide, and  $\frac{1}{8}$  to  $\frac{3}{8}$  inches deep. Before this a probe had been passed through the carious wall of the skull against the dura mater, pressure on which lowered the pulse-beat one-half. At the fifth week the wound had filled up with granulations, and in the seventh week cicatrization was complete. He remains deaf on that side.

6. *Otitis media purulenta chronica, followed by necrosis of temporal, occipital and parietal bones, with meningitis and abscess of the cerebellum.*—W. Oliver Morse, N. Y. Med. and Surg. Brief, February.

The history of the case is such as we usually find in similar ones; chronic discharge—final involvement of the mastoid cells—necrosis—meningitis—death. In this case the mastoid was freely opened and there was much discharge of fetid pus. On autopsy there was found extensive necrosis extending from the parieto-occipital to the temporo-parietal suture. In this last an opening was found leading into the cavity of the skull, on a level with the lateral sinus; probe passed through the opening entered the sinus. Meninges congested—dura mater adherent to posterior third of longitudinal sinus. In the centre of the right lobe of cerebellum, an abscess the size of a walnut.

7. *Acute inflammation of the middle ear in some of its anatomical relations.*—J. S. Prout, M. D.—*The Hospital Gazette*, N. Y., March, 1879.

In this paper Dr. P. sets forth the relation of the anatomy of the middle ear to the surrounding important parts, brain, blood-vessels, etc., and dwells on the danger of the "let alone" policy in the treatment of acute catarrhal inflammation of the drum cavity. He believes in a puncture of the drum membrane in these cases, as soon as the accumulation of fluid is so marked as to lead to a bulging of the membrane. Four cases are given in illustration of his views.

8. *Persistent tinnitus aurium, followed by symptoms of cerebral embolism, successfully treated by ligature of the post. occip. artery.* Robt. Reyburn, *National Med. Review*, Jan., 1879.

A man, 64 years of age, had first an attack of acute inflammation of the internal (?) ear on the left side. He was treated for this in the usual manner. Hearing power fully regained, but a most frightful tinnitus succeeded. The "drumming" was con-

fined to the left side and was synchronous with the pulse, and increased by anything that accelerated the action of the heart. Was treated for fifteen months with various arterial sedatives, but with no effect, except in the single case of the hydrobromic acid, which, when given in 10 minim doses every three hours, afforded some relief to the tinnitus. The patient himself discovered accidentally that, by applying a pad over the posterior occipital artery and making pressure sufficient to stop its pulsations, the tinnitus disappeared.

On examination a cirroid aneurism was found in the course of the post. occipital artery, with the characteristic thrill and bruit. A ligature was applied to the vessel, just over the groove in the mastoid process, and the tinnitus was permanently relieved.

9. *Coffee-bean from ext. aud. meatus.*—Dr. J. Solis Cohen, *Trans. Pathol. Soc., Philadelphia, vol. vii.*

The bean had remained in the meatus for fifteen years, with no inconvenience except impaired hearing, greater in damp weather, and slight neuralgic pains. After removal by the curette hearing became normal.

10. *Otitis media purulenta, mastoiditis and pyæmia.*—Dr. A. S. Reynolds, *Trans. Pathol. Soc., Philadelphia, vol. vii.*

The patient had acute inflammation of the middle ear of right side, implicating the mastoid, for two weeks. Mastoid perforated by Dr. Burnett, after which the patient improved as far as the ear trouble was concerned, and was about to be discharged from the hospital when he was taken with all the symptoms of pyæmia, from which he died. As all the vessels and sinuses about the diseased part were found in a healthy condition, there is some obscurity as to the manner in which the septic matter got into the circulation.

11. *Foreign bodies in ear and nose.*—A. Couvert, M.D., *Atlanta Med. and Surg. Four., Mar.*

Relates one case where, after unsuccessful attempts to remove a foreign body (a shot) by means of the scoop, it was caused to fall out by turning the head over to that side and jarring it with the hand.

12. *Foreign body in the ear.*—W. D. Hunt, *Southern Med. Record, Jan.*

A pea remained in the external auditory meatus for two years without causing pain. When removed it showed no signs of germination.

## REPORT ON THE PROGRESS OF OTOLOGY

IN THE FIRST HALF OF THE YEAR, 1878.

(Continued from page III.)

### IV. PATHOLOGY AND THERAPEUTICS OF THE ORGAN OF HEARING.

By A. HARTMANN, OF BERLIN.

Translated by Isidor Furst, of New York.

#### *General.*

1. WEBER-LIEL : Die Anwendung der Kälte bei acuten Affectionen des Ohres. [The Application of Cold in Acute Affections of the Ear.] *Monatsschrift für Ohrenheilkunde*, etc., No. 1, 1878.
2. F. WOAKES : Noises in the Head ; their Etiology, Diagnosis, and Treatment. *The Lancet*, Feb., 1878.
3. E. WOAKES : The Connection between Stomachic and Labyrinthine Vertigo. *Brit. Med. Journ.*, March, 1878.
4. DR. W. POORTEN : Ein Fall von objectiv wahrnehmbaren Ohrgeräuschen. [A Case of objectively perceptible Noises in the Ear.] (Riga.) *Monatsschrift für Ohrenheilkunde*, etc., No. 4, 1878.
5. DR. WEIL (of Stuttgart) : Reflexwirkung im Gebiete des Gehörorgans. [Reflex action in the Region of the Organ of Hearing.] *Monatsschrift für Ohrenheilkunde*, etc., No. 6, 1878.
6. R. VOLTOLINI ; Otolgia intermittens. *Monatsschrift für Ohrenheilkunde*, etc., No. 5, 1878.
7. WEBER-LIEL : Ueber fragmentäre, larvirte Formen des Wechselfiebers im Gebiete des Gehörorgans ; Malarianeuralgien im Gebiete des Trigeminus und der andern das Ohr versorgenden Nerven. [On fragmentary, masked Forms of Intermittent Fever in the Region of the Organ of Hearing ; Malarial Neuralgias in the Region of the Trigeminus and the other Nerves supplying the Ear.] *Monatsschrift für Ohrenheilkunde*, No. 5, 1878.

8. JAMES PATTERSON-CASSELLS : Sewer-Gas and Ear-Disease : a Record of Struggles with foul Drains and other Insanitary Conditions. *Edinb. Med. Journal*, April, 1878.

9. DIEULAFOY : Des troubles auditifs de la maladie de Bright. [Auditory Disturbances in Bright's Disease.] *Gazette hebdom.*, No. 4, 1878.

10. DR. GUERDER (Longwy): L'otologie dans les dix dernières années. [Otology in the last ten years.] *Annales des maladies de l'oreille*, etc., tome iv, No. 1.

11. J. J. KIRK-DUNCANSON : Report of One Hundred Cases of Diseases of the Ear. *Edinburgh Med. Journ.*, March, 1878.

12. J. PATTERSON-CASSELLS : Thoughts and Suggestions concerning the Education of Deaf Children, *Edinburgh Med. Journ.*, Feb., 1878.

13. PROF. EMILIO DE ROSSI : Relazione sopra l'Ospizio dei Sordo-Muti di Roma. [Report on the Hospital for Deaf-Mutes at Rome.] *Estratto dagli Atti dell' Accademia Med. di Roma*, anno IV, fasc. 2.

14. DR. HEDINGER (of Stuttgart): Eine neue Batterie für Galvanokaustik. [A new Battery for Galvano-Caustics.] *Deutsche Med. Wochenschrift*, No. 22, 1878.

15. PROF. D. VOLTOLINI (of Breslau): Eine neue galvanische Batterie und neue galvanokaustische Instruments. [A new Galvanic Battery and new Galvano-Caustic Instruments.] *Deutsche Zeitschrift für pract. Medicin*, No. 22, 1878.

1. In acute inflammations of the external auditory meatus, Weber-Liel applies cold compresses to the ear in conjunction with the alcoholic ear-baths recommended by him, and reports favorable results. He most ardently advocates these compresses in the acute inflammation of the middle ear, for moderating the pain and reducing the hyperæmia. This treatment does not appear appropriate in simultaneous violent inflammation of the nasopharyngeal space, while it could not be replaced by any other therapeusis, in the author's opinion, in the idiopathic and traumatic, respectively artificial, form of inflammation. By cold applications Weber-Liel understands Priessnitz's compresses, to be changed at first every half-hour, later every one or two hours. According to the experience of other authors, agreeing with that of the Reviewer, ice applications are productive of the best results in just the above-mentioned forms of acute inflammation of the middle ear.



2. Woakes attempts to surmount the difficulties hitherto encountered in the classification of the different noises in the ear, by making them dependent upon various pathological conditions in the ear. Woakes starts with the view that every noise perceived must have an objective real cause. Therefore, no regard is had to the physiological experience that sensory perceptions may also be produced by heterologous excitations, and that exciting causes, both in its terminal apparatus and in its course, may arouse its specific energy. Despite the uncertainty underlying Woakes' labors in this assumption, his deductions offer many suggestions of interest, and will lead to further investigations. Pulsating noises are evoked by arterial congestion, as a cause of which he considers mainly the disturbance of innervation by the *sympathicus colli* (comp. 3). Continuous noises result from venous hyperæmia, from circulatory derangements of the blood. In one case these noises disappeared under the application of Carlsbad salt. The pulsating noises appearing in anæmia and aneurisms are also objectively perceptible, and take their origin outside the organ of hearing. The intermittent boiling, bubbling noises are said to be caused by ingress and egress of air during accumulations of secretions in the Eustachian tube and the tympanic cavity, and may be removed by appropriate treatment.

3. Woakes emphasizes the fact that the labyrinth receives its blood-supply through the *arteria vertebralis*, and hence that constrictions and dilatations of this vessel, dependent upon the inferior ganglion of the *sympathicus colli*, must make themselves felt in the labyrinth. In defective innervation a hyperæmia occurs in the region supplied by the artery, causing pulsating noises in the labyrinth and vertigo. Inasmuch as the lower cervical ganglion is in connection with the vagus and the plexus brachialis, the relations between symptoms referable to the labyrinth and those of the stomach, heart, and upper extremity, may be demonstrated. A shock received may extend its effects from one of these regions also to the others. This is the author's explanation of labyrinthine and stomachic vertigo. Hyperæmia of the labyrinth is often produced, in the author's opinion, by disturbances of innervation from the lower cervical ganglion. Tobacco and quinia act as checks, hydrobromic acid as an excitant, upon the innervation. The author observed good effects from the latter remedy in tinnitus and vertigo.

4. In a female patient, æt. 45, troubled with nervous affections,

there occurred, subsequent to a trauma, beating in the left orbit, headache, and in the left ear a loud noise resembling the roaring of the ocean. At the distance of eight inches from the ear, and particularly by auscultation of the skull, a loud, blowing noise was perceptible which, on closer investigation, proved to be a systolic murmur isochronous with the pulse-beat. Compression of the carotid did not cause its disappearance. Poorten collects three similar cases from otological literature known to him, and calls attention to the relatively frequently observed, objectively perceptible noises in traumatic injuries of the eye caused by aneurisms of the orbit. In Poorten's case likewise a plainly visible prominence (6 mm.) of the left globe soon occurred.

5. Weil observed, in isolated cases, remission of subjective auditory sensations produced by intermittent injections of air against the walls of the external ear-canal.

6. The case reported by Voltolini concerned a boy of ten years of age, who had for some considerable time complained of pains in the ear which increased in severity and particularly occurred at night. Impairment of hearing. Aside from a somewhat reddened membrana tympani, nothing abnormal was found; improvement of hearing by the air-douche. Leeches, ice applications, and chloroform proved unavailing, until Voltolini finally suspected an *intermittens larvata* from the severity of the intermitting pains. After the exhibition of quinia, 0.05 gm. every hour, the pain disappeared in the first night, and did not recur under the continuance of the remedy.

7. In connection with the preceding publication of Voltolini, Weber-Liel claims priority regarding the first communication of an intermittent occurrence of ear-affections caused by malarial infection. According to Weber-Liel, otitis intermittens is said to occur in conjunction with angina and naso-pharyngeal catarrh, with pain, fever, impairment of hearing, and subjective noises; early occurrence of exudation into the tympanic cavity. Cessation of pain during the day. Weber-Liel believes that many forms of impaired hearing should be attributed to malarial infection. After a longer persistence of the affection and subsequent local metamorphoses, quinia treatment proves unavailing. The author mentions a case in which loud auditory noises, occurring with nightly exacerbation and impairment of hearing, after an existence of several months, were cured in a short time by the exhibition of quinia.

8. Patterson-Cassels describes observations made upon members of his own family as to how the admixture of a small quantity of sewer-gas to the atmosphere may give rise to general indisposition and to serious affections of the ear. Of the five children of the author, four fell ill within a short time of acute inflammation of the middle ear, in three with violent, acute symptoms which could be easily mastered by the treatment adopted—paracentesis membranæ tympani. In the fourth child he discovered, a few days subsequently, an almost complete deafness consequent upon a painless catarrh of the middle ear, which yielded only to prolonged treatment and after repeated incisions of both membranæ tympani. A minute investigation of the sanitary condition of the dwelling disclosed the fact that sewer-gas from two water-closets could escape into the house, and the cess-pool had not been emptied for two years.

In connection with the occurrence of inflammation of the middle ear observed in his own dwelling, the author reports a series of similar observations tending to prove that unwholesome sanitary conditions—particularly defective drainage and stagnation of sewer products—may give rise to ear affections curable either by removal of the cause or by transferring the patients into a better atmosphere.

9. Dieulafoy reports that since he directed his attention to the auditory disturbances occurring in the various forms of Bright's disease, he found them by no means rare, but that they should be taken into consideration just as well as the ocular disturbances. At times only subjective noises, at times impairment of hearing, sometimes both symptoms are present, either in one or both ears. Deafness is rare; at times there is violent pain in the face and the ears. The disturbances of hearing may occur in all forms and stages of the nephritis. Regarding the pathological alterations on which the auditory disturbances are based, Dieulafoy offers only conjectures. In reference to diagnosis Dieulafoy thinks that, where there are disturbances of hearing accompanying cardiac symptoms or such as indicate uræmia, we ought to examine the urine.

10. In his discussion of the otology in the last ten years, Guerder in his first section reports fully on anterior and posterior rhinoscopy. The second section treats of the "subjective examination of the ear," wherein he discusses the importance of the air-douche as a means of diagnosis, and the auscultation in sound conduc-

tion through the bones of the skull. The purely objective and reserved position the author assumes in diagnostic valuation of auscultation is pleasing, inasmuch as he arrives at the conclusion that the auscultation of the ear has, to a certain degree, disappointed our expectations. Guerder expresses himself with the same reserve regarding auscultation in sound conduction through the bones of the skull, and as to the entotic application of the ear-trumpet after Bing.

11. Among the one hundred cases, reported by Kirk-Duncanson, a malignant neoplasm, at first considered as a mucous polypus, is noteworthy. During five years a swelling in the external auditory meatus had repeatedly occurred, and had been excised until it finally assumed a malignant character, rapidly proliferating and causing death after very violent pains.

In speaking of four deaf-mutes coming under observation, the author not unjustly expresses his surprise at there being no further opportunity for the instruction of deaf-mutes after the German method in Edinburgh, where formerly, under Braidwood, the instruction of deaf-mutes in articulate language flourished.

12. After fully discussing the condition under which the development of speech takes place, and the deleterious effect the loss of hearing and speech has on the intellectual growth of the child, Patterson-Cassels calls attention to the importance for deaf-mutes of acquiring speech, and advises his countrymen to abandon the language of signs in the instruction of deaf-mutes, and to introduce the German method, teaching articulate speech. The reviewer begs to add that the German method, according to which some English institutions likewise teach, could be advantageously introduced mainly where there is an ample staff of teachers and the course of instruction can be extended to a duration of six to eight years.

13. De Rossi, in his extensive work (forty-four pages), gives a report of his examination made at the Deaf-Mute Institute at Rome. The results obtained by Rossi respecting the hearing capacity of deaf-mutes and the morbid processes underlying deaf-mutism differ in many particulars from views hitherto prevailing. A comprehensive historical discussion of the development of deaf-mute instruction follows. At the conclusion he dilates on the need of accurate statistical information to be furnished by physicians. Further, that it is the physician's business to decide whether treatment of the organ of hearing should be instituted or

not. Besides, the physician is to determine whether the deaf-mute should be instructed by the finger alphabet or in articulate speech. The latter task is unnecessary in Germany, where articulate speech alone is taught.

14. The galvano-caustic battery described by Hedinger consists of six large zinc-carbon elements immersed in Bunsen's mixture of potassa bichromate with sulphuric acid, and provided with submersion and lifting apparatus; it is accompanied by a galvano meter, commutator and regulator. The battery requires little attention, as the fluid needs changing but rarely. The easily regulated current of constant strength is extolled. The price of the apparatus, with all attachments is 250 marks at the manufacturer's, Baur in Stuttgart; four elements, with simple lifting and immersion device, 80 marks.

15. Of similar construction, likewise consisting of zinc-carbon elements and filled with Bunsen's fluid, is the apparatus described by Voltolini, which is manufactured in three different sizes by Brade, in Breslau. The small apparatus at 45 marks is said by Voltolini to be sufficient for all galvano-caustic operations. Compared with Middeldorpf's battery, its lesser constancy in effect is emphasized to its disadvantage, while it exceeds the latter in intensity of glowing power.

### External Ear.

16. PROF. J. GRUBER (of Vienna): Ueber die Wirkung der medicamentösen Gelatin-Preparate bei Otitis Externa. [On the Effects of Medicated Gelatine Preparations in Otitis Externa.] *Monatsschrift für Ohrenheilkunde*, etc., No. 2, 1878.

17. PROF. DR. MOOS (of Heidelberg): Ein Fall von Ambohrung des in Folge von Entzündung knöchern verschlossenen äusseren Gehörganges. [A case of Perforation of the External Auditory Meatus Closed by Osseous Tissue in Consequence of Inflammation.] *Virchow's Archiv*, Bd. lxxiii, 1878.

18. G. FIELD: On the Etiology of Aural Exostoses, osseous Tumors following Extraction of Polypus. *Brit. Med. Journ.*, Feb. 2, 1878.

19. DR. JACUBASCH (Military Surgeon of Berlin): Bruch des knöchernen Gehörganges in Folge eines Hufschlages. [Fracture of the Osseous Auditory Meatus in Consequence of a Kick by a Horse.] *Berl. Klin. Wochenschrift*, No. 22, 1878.

20. R. VOLTOLINI. Ueber das Offenhalten einer künstlichen Oeffnung in Trommelfelle und die ringförmige Canüle. [On Keeping an Artificial Opening in the Membrana Tympani Patulous, and the Ring-shaped Canula]. *Monatschrift für Ohrenheilkunde*, etc., No. 1, 1878.

16. Favorable experiences with medicated gelatine preparations in otitis externa causes Gruber to publish them, the more "as they might be of equally great advantage to the patients and the practising physicians, if further observations should confirm them." The gelatine preparations are made with morphia and the aqueous extract of opium in the proportion of one to ten. The medicated substance is introduced into the external auditory meatus which is then closed with cotton, once or twice daily.

17. Moos recapitulates, from the literature known to him, all cases of osseous closure of the external auditory meatus treated operatively, and lays stress on the fact that in all these cases the closure dated from a slow growth of exostoses. In a case observed by the author, the osseous closure formed with comparative quickness, and consequent upon a general hyperostosis of the walls of the external meatus. After the occurrence of an acute purulent inflammation of the right external meatus, lasting fourteen weeks, an osseous closure of the external auditory meatus, about 7 mm. in depth, supervened in the course of the following months. Deafness. Perforation of the occluding osseous mass by a drill. Relative restoration of the hearing power.

Noteworthy is the result of auscultation after insertion of the catheter, inasmuch as a loud, blowing noise was perceptible, just as after medium-sized perforations. Moos concluded from this result of auscultation that the depth of the osseous mass occluding the external auditory canal was of small extent, which was not verified during the operation. Moos explains this deception by the results of Michael's experiments on the auscultation of the mastoid process, for which the reader is referred to the original.

18. Field observed, a few months after the removal of a polypus in a girl three years of age, a small osseous tumor, the size of a pea, in the external auditory meatus, nearly filling it. Field considers as a more dangerous form of osseous new-formation in the external auditory meatus the bone-proliferation of the consistence of ivory arising entirely independent of inflammation, running a symptomless course, and becoming first perceptible by impaired hearing. In one patient, Field perforated a thick ivory-like mass,



completely filling both external auditory meatus, with a drill.

19. A soldier was kicked on the chin by a horse, in consequence of which there was hemorrhage from both ears. No cerebral symptoms. Shortly after there was swelling in both external auditory meatus, as well as in the region of both maxillary joints. Hearing normal after the removal of the blood coagula. A small splinter of bone on one side was perforating the skin of the external auditory meatus. Jacobasch thinks that for the production of a fracture the effective force must strike the lower maxillary bone in its longitudinal axis.

20. As the ring-shaped canula formerly recommended by Voltolini for insertion in the membrana tympani did not satisfy the expectations, Voltolini returns to the small tubes already used by earlier aurists for the same purpose. [Compare, *e. g.*, Frank's Handbuch, 1845, p. 310.—REV.] They are to maintain their position by resting upon the floor of the tympanic cavity and the external meatus. The tubules employed by Voltolini contain, besides the terminal apertures, lateral openings, to serve in case the former become occluded.

### Middle Ear.

21. PROF. E. ZAUFAL. Beitrag zur Typanoskopie. [Contributions to Tympanoscopy.] *Prager Medical Wochenschrift*, No. 13, 1878.

22. PROF. J. GRUBER, (of Vienna.) Zur Behandlung des Ohrenflusses. [On the Treatment of Otorrhœa.] *Algem. Wiener Med. Zeitschrift*, No. 1, 1878.

23. DR. HARTMANN, (of Berlin): Mittheilung über einen Fall von Erweichung der Gehörknöchelchen. [A Case of Softening of the Ossicles of Hearing.] *Archiv f. Ohrenheilkde.*, Bd. xiii., p. 259.

24. DR. J. PATTERSEN-CASSELLS. On the Local Use of Iodoform in Ear Disease. *Brit. Med. Journ.*, March 2, 1878.

25. DR. C. MIOT. De la ténatomie du muscle tenseur du tympan. [On Tenotomy of the Tensor Tympani Muscle.] *Le Progrès médical*, Nos. 9, 11, 13 and 14, 1878.

26. DR. SCHWABACH, (of Berlin): Nystagmusartige Augenbewegungen in Folge eines Ohrenleidens. [Nystagmus-like Motions of the Eye in Consequence of an Affection of the Ear.] *Deutsche Zeitschrift für pract. Med.*, No. 11, 1878.

27. MÉNIÈRE. Observation de délire consécutif à une otorrhée purulente chronique. [Observation of Delirium in consequence of Chronic Purulent Otorrhœa.] *Gazette des hôpitaux*, No. 19, 1878.

28. DR. L. BLAU, (of Berlin): Ein Fall von klonischem Krampf des Musc. tensor tympani ohne subjective Empfindung. [A Case of Clonic Spasm of the Tensor Tympani Muscle without Subjective Sensations.] *Archiv für Ohrenheilkunde*, Bd. xiii, p. 261.

29. H. SCHWARTZE. Casuistik zur chirurgischen Eröffnung des Warzenfortsatzes. [Case of Surgical Opening of the Mastoid Process.] *Archiv für Ohrenheilkunde*, Bd. xiii, p. 245.

30. DR. LEVI. Note sur un nouveau procédé de cathétérisme de la trompe d'Eustache. [Note on a new manner of Catheterization of the Eustachian Tube.] *Annales de maladies de l'oreille, etc.*, tome iv, No. 1.

21. Zaufal reports attempts at examination of the tympanic cavity by means of small mirrors introduced therein. He employs for the purpose small concave mirrors of steel fastened to a flexible wire. In one case Zaufal succeeded in detecting, by means of such a mirror, the attachment of a polypus at the posterior wall of the tympanic cavity—the cause of an otorrhœa hitherto unsuccessfully treated—and in removing it.

22. In otorrhœas caused by morbid processes in the external auditory meatus, especially circumscribed swellings, Gruber applies pledgets of cotton or bougies of laminaria digitata, which are covered with medicated ointments. In inflammation of the membrana tympani little pieces of linen covered with the ointment are applied to the inflamed part. In inflammation of the middle ear with largely relaxed mucous membrane, Gruber uses the gelatine preparations recommended by Catti for the nose.

23. At the autopsy of a patient, dead from phthisis pulmonalis, the Reviewer found, aside from extensive destruction of the membrana tympani and considerable swelling of the mucous membrane of the drum cavity, excessive softening of the stapes on both sides, permitting depression or bending of the head of the stapes down to the plate, which then resumed its normal condition. As the rest of the osseous system showed similar softening, the Reviewer thinks himself justified in assuming the general marasmus as the cause of the malacia.

24. In a short communication, Patterson-Cassels mentions

that he has applied iodoform with good results in ulcerations, especially those accompanying caries of the mastoid process, complicated with polypoid granulations. After removal of the granulations, the dry powder is applied.

25. On an historical review of tenotomy of the tensor tympani follows an exhaustive discussion of the anatomical conditions entering into the consideration. Miot, besides, answers to the objection, that no lasting benefit can be conferred by the operation, owing to constantly present pathological alterations upon which it has no effect, by asserting that there are cases in which the tendon or its sheath alone is affected. The author describes his instrument as a tenotome resembling that of Weber-Liel, with a concave blade at a right angle to the handle. Miot states that in most instances the subjective noises, as well as the impairment of hearing, had been diminished, and at the end reports in detail two cases in which cure followed the tenotomy.

26. In a patient affected with otorrhœa, complicated with swelling of the external auditory meatus and of the region of the mastoid process, Schwabach observed, aside from vertiginous symptoms with the tendency to fall to the left side, the interesting circumstance that nystagmus-like motions of both eyes in a horizontal direction toward the affected side occurred on pressing on the swollen parts. On removing the pressure the motions ceased. Schwabach, on the strength of Cyon's experiments, believes that the observed symptom should be considered as produced by excitation of the semicircular canals.

27. An eight-year-old boy, affected with otitis media purulenta dextra, suffered for a month previously to his coming under Ménière's treatment from attacks of temporary loss of consciousness, with succeeding depression and somnolence. The attacks sometimes occurred several times daily, sometimes after intermissions of from five to six days. After local treatment of the ear affection the attacks diminished in frequency.

28. A fourteen-year-old boy came under Blau's treatment, with the following symptoms: A sensation of pressure on the right ear, temporary lancinating pains in the same increased resonance of his own voice, manifold subjective auditory perceptions, normal hearing power. Membrana tympani normally movable on Politzer's experiment. The following appearances were observed at the membrana tympani: In variable succession, sometimes frequently or again more rarely, spasmodic motions of the mem-

brane occurred; changes of the cone of light or total retraction of the membrane occurring "with lightning rapidity" were observed. There was no connection with respiration. The boy had no subjective sensations of the motions of his membrana tympani. The author considers the motions of the *M. T.* attributable to contractions of the tensor tympani muscle.

29. Continuing his previous reports of operations, Schwartz contributes six new cases in which either present fistulæ were enlarged or an artificial opening of the mastoid process was undertaken. Two cases are particularly interesting.

After an apparent cure of acute inflammation of the middle ear (case 47) evidences of inflammation of the mastoid process were again observable. Repeated incisions proved useless. Persistence of violent pains referred to the entire half of the head. Although the tympanic cavity was free from pus and the membrana tympani imperforate, the attempt was made to lay the process open by chiselling. Penetrating to the depth of 2 *cm*, still an opening of the antrum could not be obtained, and the operation was abandoned without liberating any pus. Healing with complete removal of all symptoms six weeks after the operation.

In a boy (case 50) suffering from fetid otorrhœa right, very violent, continuous otalgia, fever, and œdema at the mastoid process occurred. On incision, a narrow fistulous opening was found at the height of the antrum mastoideum, was widened with a gouge sufficiently to permit the introduction of a hollow sharp spoon. On scraping out the granulations and the caseous pus, an uncommonly violent hemorrhage occurred, which was stopped by the insertion of a drainage tube filling the osseous opening. Pyæmic fever, development of a metastatic lung-abscess. Recovery from the pyæmia. Death nine weeks after the operation, probably from anæmia (?). No post-mortem.

At the end of his communications Schwartz promises a comprehensive discussion of his hitherto published reports of operations. When Schwartz expresses the opinion that the general application of the operation has been injured by some anatomical researches which he thinks, have exaggerated the dangers met with in the region of the operation, the Reviewer permits himself the remark that by an exposition of the anatomical relations entering into consideration during an operation, the general application of an operation may perhaps be injured, but not the welfare of the patient.

30. Levi describes a modification of catheterization of the Eustachian tube called by him Boyer's procedure. Boyer's method of introducing the catheter consists, as reported by the author in an earlier publication, in guiding the point of the catheter only to the posterior margin of the choanæ, and by turning to bring the mouth directly into the tubal orifice. In Levi's new procedure the catheter is turned during a deep inspiration with mouth closed. Levi believes that in this way no contraction of the muscles of the palate can occur, which in other methods frequently interferes with the introduction of the catheter.

*Inner Ear.*

PROF. DR. MOOS, (of Heidelberg): Ueber das Vorkommen und die Bedeutung phosphorsaurer Kalkconcremente im Stamme des Gehörnerven. [On the Occurrence and the Significance of Concretions of Phosphate of Lime in the trunk of the Auditory Nerve.] Lecture read at the meeting of Southwestern German Neurologists. *Archiv für Psychiatrie*, Bd. ix, Heft 1. Compare the report on Pathological Anatomy.

32. DR. KISPERT, (of Madrid): Halbseitiger Verlust des Gesichts und Gehörsinnes mit Hemikranie in Folge von Sympathicuslähmung. [Semilateral Loss of the Senses of Sight and Hearing with Hemicrania consequent on Paralysis of the Sympathetic.] *Deutsche Zeitschrift für pract. Medicin*, Nos. 3 and 4, 1878.

33. DR. FISCHER, (of Pforzheim): Ueber den Einfluss des galvanischen Stromes auf Gehörs-Hallucinationen. [On the Influence of the Galvanic Current on Hallucinations of Hearing.] Read before the meeting of Southwestern German Neurologists. *Archiv für Psychiatrie*, Bd. ix, Heft 1.

32. A woman, æt. 25, suddenly lost sight and hearing on the right side, and exceedingly violent penetrating pains occurred in the right half of the head. Objectively perceptible were only, right, a considerable narrowing of the pupil and dilatation of the retinal vessels; no abnormality in the ear. Kispert's diagnosis of a right-sided paralysis of the sympathicus colli, with consecutive dilatation of the vessels of the right half of the head, was verified by the treatment, all manifestations completely disappearing after four days' use of *secale cornutum*.

33. In his lecture, of interest also to the otologist, Fischer reports a series of investigations on hallucinations of hearing in the

insane, of which one case is specially noteworthy. It was that of a weakly man suffering from pronounced hypochondriac melancholia with vivid hallucinations of all senses. The hallucinations of hearing consisted in clearly distinguishing the voices of some relatives. On testing the galvanic reaction of the *nervi acustici*, no sensation of sound was experienced with a strong current, while the hallucinations of hearing ceased almost entirely during the continuance of the current; only twice the patient heard voices—the one, during the flow of the current, was heard as loud, but as coming from a greater distance than customary; the other, while the current was interrupted, was heard in a whisper. Thereupon a regular, galvanic treatment of the brain was instituted: a current of 8 to 10 elements along and across the head. During a daily treatment for two months steady improvement, eventually complete cure; simultaneous continuous increase of bodily vigor. With the hallucinations, the subjective noises accompanying them, also disappeared. From the analogous condition of both symptoms Fischer concludes that they both depended upon the same pathologico-anatomical lesion. The author further believes that delicate disturbances of nutrition in the central nervous apparatus should be considered as underlying the affection.

#### *Naso-Pharyngeal Affections.*

34. PROF. V. TRÖLTSCH: Eine weitere Verwendbarkeit der Zerstäubung von Flüssigkeiten. [A further Indication for the Use of Spray.] *Archiv für Ohrenheilkunde*, Bd. xiii, p. 200.

35. DR. WEBER-LIEL: Zur Anwendung der Nasendouche. [On the Application of the Nasal Douche.] *Berl. Klin. Wochenschrift*, No. 13, 1878.

36. DR. A. HARTMANN, (of Berlin): Beitrag zur Lehre von der Ozäna. [Contribution to the Knowledge of Ozæna.] *Deutsche Med. Wochenschrift*, No. 13, 1878.

37. J. SCHMITHUISEN, (of Accreale): Zur Casuistik der chronischen Blennorrhœa der Nasen-, Kehlkopf- und Luftröhrenschleimhaut. [Contribution to the Knowledge of Chronic Blennorrhœa of the Mucous Membrane of the Nose, Pharynx, and Trachea.] *Berl. Klin. Wochenschrift*, No. 11, 1878.

38. E. WOAKES: Note of Iodoformed Wool. *Brit. Med. Journ.*, Feb. 9, 1898.

39. LENOX BROWNE: Iodoform as a Local Application in Naso-Pharyngeal Disease. *Ibidem*.



40. PROF. DR. E. ZAUFAL: Ueber die allegemeine Verwendbarkeit der kalten Drahtschlinge zur Operation der Nasenpolypen. [On the General Applicability of the cold Wire-loop for the Operation of Nasal Polypi.] *Prag*, 1878.

41. DR. A. HARTMANN, (of Berlin): Schwerhörigkeit bei Kindern, verursacht durch chronischen Nasen-Rachenkatarrh. [Impaired Hearing in Children caused by Chronic Naso-Pharyngeal Catarrh.] *Berl. Klin. Wochenschrift*, No. 14, 1878.

42. DR. G. JUSTI, (of Idstein): Ueber adenoide Neubildungen im Nasen-Rachenraume. [On Adenoid New-formations in the Naso-Pharyngeal Space.] Volkmann's *Samml. klin. Vorträge*, No. 125.

43. PROF. E. ZAUFAL: Zur Operation adenoider Vegetationen im Nasen-Rachenraume durch den Nasen-Rachentrichter hindurch. [On the Operation of Adenoid Vegetations in the Naso-Pharyngeal Space through the Naso-Pharyngeal Speculum.] *Prag. Med. Wochenschrift*, No. 16, 1878.

44. DR. H. BENSCH, (of Berlin): Beiträge zur Berurtheilung der chirurgischen Behandlung der Nasen-Rachenpolypen. [Critical Contributions to the Surgical Treatment of Naso-Pharyngeal Polypi.] Breslau, 1878.

34. V. Tröltsch calls attention to the applicability of the well-known atomizer recommended by him, not only for harmless liquids, but also for stronger substances, particularly solutions of silver nitrate. The atomizer is inserted into a narrow cylindrical vessel, instead of the ordinary large one, and thus any desired number of drops of the liquid in use may be applied in a finely divided condition to the mucous membrane of the larynx, the pharynx, or the naso-pharyngeal cavity, while formerly a manipulation with brush and sponge-holder was required. This application of the apparatus seems particularly commendable for the treatment of the patient by himself.

35. Weber-Liel very fully discusses the conditions under which, in his opinion, the entrance of fluids into the middle ear, by the use of the nasal douche, is possible. Herein he starts from the somewhat incorrect presumption, as Reviewer thinks to have proved by his experimental investigations, that the mouth of the tube is closed by the contraction of the levatores veli. Weber employs as nasal douche a glass syringe with an olive-shaped nozzle. In order to prevent inflammation of the middle ear by the influx of fluid, he recommends the use of a soda solution

in place of the customary common-salt solution of table-salt.

36. Reviewer was unable to confirm Michel's opinion—that ozæna is based on an affection of the cavities adjoining the nasal fossæ—in a patient suffering from a typical form of that disease, on whom he had the opportunity of performing a post-mortem section. The cavities of the ethmoid bone were found normal; those of the sphenoid of small dimensions, so that the secretion must have been formed exclusively from the Schneiderian membrane. As to the origin of ozæna, Reviewer pronounces against the opinion that an originally chronic catarrh with swelling of the mucous membrane, later develops into ozæna with atrophy of the mucous membrane, and believes that the great width of the nasal cavity, which Zaufal lays stress on, is in most cases the congenital disposition causing the disease.

37. Under the quoted heading, Schmithuisen describes two cases of disease from Störk's Clinique. In both, greenish-black scabs, accompanied by ropy, purulent sputa, had been discharged for some time from the naso-pharyngeal space when the patient blows his nose, and from the larynx when he coughed. An examination, chiefly confined to the larynx and trachea, disclosed the formation of scabs in both parts. Therapeutical means proved unavailing. The description shows that in both cases the form of the disease was that commonly designated as ozæna.

38. Woakes believes iodoform to have a specific influence in cases of rhinitis, ozæna, naso-pharyngeal catarrh, and swellings in the naso-pharyngeal space. The ethereal solution causing too severe a pain, Woakes applies iodoformed cotton—a drachm of cotton containing one drachm of iodoform. Small flocks thereof, introduced into the nose, remain for a longer or shorter time.

39. Browne likewise recommends iodoform in chronic naso-pharyngeal catarrh with inflammation of the mucous membrane. He employs the ethereal solution, 1 to 10-12, painting the naso-pharyngeal space two or three times a week. For the patient's own use, Browne orders a mixture of iodoform (5-8 grains dissolved in ether) with vaseline (1 ounce), to be applied by means of a brush through the nose.

40. In the introduction to his extensive treatise, Zaufal calls attention to the connection, caused by the anatomical relation, of affections of the ear to those of the nose, mentions the frequent attack of the organ of hearing in acute catarrh, as well as in chronic affections of the nasal cavity, particularly in ozæna, in

which Zaufal observed the implication of the ear in 80 per cent. of the cases. The frequency of aural affections is somewhat less, according to Zaufal, in nasal polypi (56 per cent.), and, as Zaufal justly emphasizes, the rational treatment of the organ of hearing can primarily consist only of the removal of the nasal polypi, for which purpose Zaufal uses his own modification of Blake's snare.

Zaufal grasps every single polypus with the snare which is pushed up to the root, and cuts the piece seized. He cautions against Voltolini's proposition, to seize and tear off whole bunches of polypi. This caution does not appear entirely justified to the Reviewer, in the presence of a large number of polypi. In Reviewer's experience, the hemorrhage during the tearing off of larger bunches grasped by the snare is scarcely more severe than during the cutting, nor is the pain particularly great, while the polypi are removed more completely and in a shorter time.

To prevent recurrence, the roots should be cauterized by the galvano-cautery, or, instead, with chloride of zinc or nitrate of silver in substance.

41. Basing himself on his experience, the Reviewer disproves the still largely prevailing opinion lately advanced by Störk, that the impairment of hearing in children, caused by chronic naso-pharyngeal catarrh with consecutive proliferation of granulations, was impossible to remove, and that the contraction of the tube could not be overcome. Two cases are more fully described, in which not only a high degree of deafness was improved by the removal of the naso-pharyngeal affection, but a better permeability of the tubes was also obtained.

42. After a lengthy introduction treating of the character of adenoid proliferations and the symptoms they produce, Justi recommends for their operation his formerly described sharp spoon fastened to a flexible stem or a ring. He constructed four forms of spoon, according to their intended use at the posterior, anterior, or lateral walls of the naso-pharyngeal space. Reviewer repeatedly operated with Justi's spoon, which proves serviceable if the operation by the help of the mirror fails. The manipulation of the instrument is steadier if a rigid stem is used in place of the flexible one.

43. Zaufal states that he introduces a loop of elastic wire through his naso-pharyngeal specula; this loop, unfolding by its elasticity in the naso-pharyngeal space, is appropriate for the removal of adenoid proliferations.

44. The monograph of Bensch, dedicated to Votolini, is distinguished by an exceedingly careful exposition of the views hitherto held regarding naso-pharyngeal polypi, both in genetic and in prognostic and therapeutic relations. In the introduction the term naso-pharyngeal polypus is defined. The peculiar clinical picture representing a fibrous neoplasm, originating, with a broad basis, in the periosteum of the bony walls of the pharyngeal cavity, and the basilar fibrocartilage, is designated a "clinical naso-pharyngeal polypus."

The clinical naso-pharyngeal polypus develops in early youth, which fact, according to the author's deductions, proves its connection with the evolution of the skull; and from this manner of development the author forms a favorable prognosis as to relapses and further growth in advancing years. The dreaded hemorrhages do not flow from the tissue of the polypus, but from the investing mucous membrane.

The treatment of naso-pharyngeal polypi forms the most important section in Bensch's treatise, and the operative methods from the time of Hippocrates to the present day are discussed especially the advantages and disadvantages of the definitive and temporary preliminary resections of von Langenbeck. Lastly the author describes the rhinoscopic-surgical procedure of Votolini, which consists of two steps: 1st. The preliminary extirpation of the polypus, for which the galvano-caustic loop or a gouge, specially constructed for the purpose, is employed; 2d. The destruction of the root under guidance of the mirror, with the cupola-burner.

The valuable work of the author is heartily recommended to every one who takes an interest in the subject and to those who practise rhinoscopic surgery.

NORMAL AND PATHOLOGICAL ANATOMY AND HISTOLOGY OF  
THE ORGAN OF HEARING.

By H. STEINBRÜGGE.

Translated by ISIDOR FURST, of New York.

1. Die Gelenke der Gehörknöchelchen und die Knorpel des Ohres. [The Joints of the Ossicles and the Cartilages of the Ear.] By DR. EUGEN KÖRNER. *Monatsschrift f. Ohrenheilkde*, 1878, No. 11.

2. Zur Casuistik der Knochenlücken im Schläfenbein. [The Fissures in the Temporal Bone.] By DR. K. BÜRKNER. *Arch. f. Ohrenheilkde.*, Bd. xiv., Heft 2.

3. Die embolischen Erkrankungen des Gehörorgans. [The Embolic Affections of the Organ of Hearing.] By F. TRAUTMANN, *Archiv f. Ohrenheilkde*, Bd. xiv, Heft 2.

Bürkner (1), in an historical review, discusses the views of authors (Brunner, Eysel, Henle) dissenting from Rüdinger's assumption of an intercalary cartilage in the malleo-incudal and the incudo-stapedial joints; he treats of the connection of the stapes-plate with the fenestra ovalis, after Rüdinger, Toynbee, Magnus, Henle; and then communicates his own numerous investigations, the results of which confirm Rüdinger's conclusions regarding the intercalary cartilage. The joints of the ossicles were softened in an eight per cent. solution of chromic acid with the addition of from six to eight drops of muriatic acid, and were then divided into thin sections. During this operation the meniscus drops out very easily, if the joints are not quite sound. Both malleus and incus contain a central canal filled with a grumous marrow and drops of fat—the marrow-canal (Rüdinger). The surfaces of the joints in the entire region of the capsule, are covered with hyaline cartilage; the capsule on the medial is thicker than on the lateral side. The fibro-cartilaginous meniscus is connected at the circumference of its broad margin to the capsule by a loose tissue: while its surfaces nowhere connect with the ends of the joints (invested with cartilage) of the malleus or incus. In the incudo-stapedial joint the conditions are in the main the same. The capsule of the joint is thicker in front than behind, and is fastened to the lenticular process by a strong, circular belt of connective tissue. Some tendinous fibres of the stapedius muscle, traversing the capsule, likewise reach the lenticular process. Of 57 specimens examined Körner found the meniscus in 35.

In the last paragraph the author discusses the arrangement of the cartilaginous tissue at the chain of ossicles (cartilage at the short process of the incus, and that at the margin of the fenestra ovalis), considering it a poor conductor for sound waves, and hence an isolater intended to prevent deflection of sound by the adjoining osseous substance from its course to the labyrinth.

Bürkner (2), by the further examination of ninety-two skulls, finds confirmation of the results concerning the origin of dehiscences and fissures, communicated by him in the thirteenth volume of the *Archiv für Ohrenheilkunde*. The percentage of thinnings of the tegmen tympani alone, as well as in connection with the roof of the orbital cavity, was approximatively the same as in his first investigations. He describes three skulls with defects of ossification in the external auditory meatus, two were particularly interesting, showing defective development also in other parts. A thin-walled skull was taken from a man of forty years and showed infantile dimensions; another came from a crétin thirty years of age.

Trautmann (3) distinguishes between emboli caused by affections of the organ of hearing itself, and those originating in the blood-vessels of distant parts of the body. The results of thirteen autopsies show chiefly endocarditic valvular deposits. The reason why the vessels of the labyrinth are more rarely affected than those of the middle ear is attributed to the curved course of the vertebral artery. On the other hand, coagula enter the more easily the posterior auricular artery, and thence the stylomastoid artery and the tympanic branch, the lower the post. Auricular artery is given off from the external carotid, *i. e.*, the more acute the angle between it and the main trunk becomes. The superior and obtuse-angled bifurcation seems to be of frequent occurrence, hence embolic processes in the middle ear come comparatively rarely under observation. Among thirteen cases communicated, the middle ear was affected four times. He found clearly-defined hemorrhages varying from the size of a millet-seed to that of a lentil, in the membrana tympani, the lining of the incus, the mucous membrane of the tympanic cavity, and the mastoid cells; besides coagula of fibrine filling the drum cavity and extending through the antrum into the mastoid cells. The microscopic examination of the tympanic mucous membrane showed finely granular emboli in the arteries; micrococci could be demonstrated only in the connective tissue, but not with any certainty in the ves-



sels. The membrana tympani was particularly affected in its mucous layer. Finally Trautmann reminds us that hemorrhages and fibrinous coagula in the middle ear occur also in parenchymatous nephritis and angina diphtheritica (case of Schwartz and the author), and cites two new autopsies. The embolic affections of the organ of hearing, should they be recognized during life, furnish an unfavorable prognosis *quod vitam*, as they are mostly complicated with other grave diseases.

Regarding Friedreich's case of embolism of the basilar artery, mentioned in the beginning of the paper, we have to report that, according to Friedreich's own statement, an embolus was found post-mortem also in the arteria auditiva interna.

## II. PHYSIOLOGY OF THE ORGAN OF HEARING.

By OSCAR WOLF, OF FRANKFORT-ON-THE-MAIN.

Translated by Isidor Furst, of New York.

1. DR. ARTHUR HARTMANN, of Berlin: "Mittheilung über die Function der Tuba Eustachii." [Communication concerning the Function of the Eustachian Tube.] *Archiv. f. Anatomie und Physiologie* by His, Braune, and du Bois-Reymond, 1877.

2. PROF. DR. AUGUST LUCAE, of Berlin: "Zum Mechanismus des Gaumensegels und der Tuba Eustachii bei Normalhörenden." [Contribution to the Mechanism of the Soft Palate and of the Eustachian Tube in Persons of Normal Hearing.] Virchow's *Archiv*, Bd. lxxiv.

3. DR. ARTHUR HARTMANN, of Berlin: "Experimentelle Studien ueber die Function der Eustachischen Röhre." [Experimental Studies on the Function of the Eustachian Tube.] Leipzig: Veit & Co., 1879.\*

4. DR. ARTHUR HARTMANN: "Ueber die Bestimmung der Durchgängigkeit der Eustachischen Roehre mit Hilfe des Quecksilbermanometers." [On the Determination of the Permeability of the Eustachian Tube by Means of the Mercury Manometer.] Virchow's *Archiv*, Bd. lxxiv.

5. PROF. DR. AUGUST LUCAE: "Historischer Beitrag zur modernen Ohrenheilkunde." [Historical Contribution to Modern Otology.] Virchow's *Archiv*, Bd. lxxiv.

6. H. DENNERT: "Zur Physiologie der Tuba Eustachii auf Grund einer Beobachtung von doppelseitigem organischem Ver-

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\* Published end of October, 1878.—REV.

schluss der Rachenmuendung derselben." [Contribution to the Physiology of the Eustachian Tube, based on an Observation of bilateral organic Occlusion of its Pharyngeal Opening.] *Deutsche Zeitschr. f. pract. Med.*, 1878, No. 44.

7. PROF. V. HENSEN, of Kiel: "Beobachtung ueber die Thätigkeit des Trommelfelspanners bei Hund und Katze." [Observation on the Action of the Tensor Tympani in the Dog and Cat.] *Archiv f. Anatomie und Physiologie* by His, Braune and E. du Bois-Reymond; Physiologischer Theil, 1878, Heft 4.

8. DR. K. BÜRKNER, of Goettengen: "Casuistisches ueber intermittirende Schallperception vom Knochen." [Cases of Intermittent Sound Perception through the Bone.] *Archiv f. Ohrenheilkde*, Bd. xiv, Heft 2.

9. PROF. DR. AUGUST LUCÆ: "Statistische Uebersicht ueber die vom 1 November 1874 bis 1 November 1877 in der Berliner Universitätspoliklinik für Ohrenkranke behandelten Kranken, nebst Bemerkungen zur prakt. Ohrenheilkunde." [Statistical Review of the Patients treated at the Clinic for Ear Diseases at the University of Berlin, from November 1, 1874, to November 1, 1877; with Remarks on Practical Otology.] *Ibid.*, Bd. xiv, Heft 2.

10. DR. THORNER: "Beitrag zum Nachweis schwacher Inductionstroeme." [Demonstration of weak Induced Currents.] *Berlin. med. Centralbl.*, No. 33, 1878.

In reading the publications enumerated ad 1 to 5, "on the function of the Eustachian tube," and the controversies on this subject between Lucae and Hartmann, the Reviewer cannot forbear remarking that he has followed with but little pleasure and satisfaction the many personal remarks which certainly do not appear to assist in the solution of the mooted question, and which, therefore, ought to have been left off.

To ascertain the function of the tube, A. Hartmann (1) manometrically determined the air-pressure necessary to permit, in various conditions of the tube, the entrance of air into the tympanic cavity. He instituted his experiments in the pneumatic cabinet, in which the amount of pressure exerted by the compressed air could be read off on a mercury manometer. He arrived at the conclusion *that the entrance to the tube remained closed as long as the muscles of the palate are in a state of rest, but that it opens in the act of deglutition.* During the act of deglutition, the membranous wall of the tube, relaxed in the state of rest, becomes tense, thus transforming the flexible canal into a rigid one.

Hartmann further stated that a very great condensation of air in the naso-pharyngeal space, up to 200 mm. Hg., for itself was not only incapable of causing the entrance of air into the drum-cavity, but, on the contrary, that it pressed the membranous wall more firmly against its cartilaginous roof; by the act of deglutition alone, as described above, is the valvular closure at the mouth of the tube opened. From the drum-cavity, however, even a slightly increased pressure overcomes the obstacle, so that with 20 mm. Hg. the membranous wall is lifted from the cartilaginous roof, and air escapes from the drum-cavity; proof—the subjective sensation of escaping air-bubbles when the air in the pneumatic cabinet is rarefied.

Lucae (2) observed the motions of the mouth of the tube in two persons of normal hearing, in whom extensive syphilitic destruction of the nasal septum and the muscles permitted a clear inspection of the tubes in the state of rest, as well as during phonation and deglutition. He arrived at the conclusion that *the mouth of the tube is compressed when the soft palate rises, to be opened again when it falls, hence that a kind of pumping action takes place.*

Both observers concur in the belief that the act of deglutition furthers the ventilation of the tubes and the tympanic cavity. But Lucae now adds that probably an internal dilatation accompanies the external closure of the tube.

Hartmann (3) then treated the question more fully in a monograph based on extensive experiments. In the first chapter he gives, with doubtless impartiality, an historical review of previous investigations. In the second, headed, "Permeability of the Eustachian Tube in the State of Rest of the Muscles," he describes his observations on twenty-two persons—six of whom were physicians—in the pneumatic cabinet, and arrives at the conclusion that very great condensation of the air in the naso-pharyngeal space impedes the opening of the tube even in the act of deglutition, by pressing the membranous part of the tube against the cartilaginous roof, as mentioned above. In the third chapter he discusses the state of the Eustachian tube during respiration, and proves that ordinarily no exchange takes place during respiration, between the air in the tympanic cavity and that in the pharynx; only in *abnormally* pervious tubes are motions of the membrana tympani observed in consonance with the variations of pressure in the naso-pharyngeal space during respiration. The succeeding chapter proves experimentally that, in Valsalva's experiment, air

enters the tympanic cavity on an average with a pressure of from 20-40 *mm.* Hg. Hartmann further investigated the condition of the Eustachian tube during phonation, and found that phonation can only facilitate the passage of air, but by no means completely open the tube, as deglutition does. In deglutition the tube opens only during the first movement of swallowing, at the moment of the greatest contraction of the muscles, which may be clearly demonstrated by the simultaneous observation of the *membrana tympani*.

The *direct inspection* of the mouth of the tube in the living finally confirmed to the author Zaufal's view: "that the muscular contraction during the act of deglutition moves the medial cartilaginous plate of the tube backward and medially. In this way the floor of the mouth of the tube expands by the separation of the lateral walls from each other, at the same time, the prominence of the levator advances toward the orifice of the tube, which thereby is narrowed in the direction from above downward, and in the direction from behind forward.

In the ninth chapter he discusses the sound-conducting power of the tube, without giving a definite opinion as to its acoustic function. The Reviewer may in this place be permitted to call to mind that he (*Sprache und Ohr*, p. 240 seq.), classed the tube among the "protective parts of the ear," and demonstrated it to be a tube for the outlet of sound; namely, the anatomical constitution of this tube materially facilitates its function—to permit the escape of sound waves from the rigid walls of the osseous tympanic cavity into the external air. If we consider that the cartilaginous auricle appears excellently adapted to the conduction of sound waves from the air to the osseous auditory meatus, it is on the other hand a favorable condition that the sound waves can return to the external air from the tympanic cavity and the osseous portion of the tube through its cartilaginous part. For acoustic purposes it is immaterial, whether the tube, in the direction toward the ostium tympanicum, is open or slightly closed by contact of the folds of the mucous membrane. Interesting, and to a certain extent indirectly confirming the opinion of the Reviewer, is the proof furnished by Hartmann that a very slight excess of pressure of 22 *mm.* Hg. from the tympanic cavity suffices to overcome the closure of the tube. Hereby it may be explained that even considerable excursions of the *membrana tympani*, produced by loud sounds, do not cause a compression of the rel-

atively small quantity of air in the tympanic cavity, but that the air easily escapes through the tube. If our ear lacked the described protective apparatus, loud sounds could scarcely fail to produce grave alterations in the organ.

In the last two chapters of Hartmann's monograph we find some practically valuable remarks on the condition of the tube in various pathological conditions, and rules for the use of the nasal douche. The succeeding little article of Hartmann (4), which once again turns against Lucae's attacks, and the latter's reply (5), in seven, respectively nine, closely printed pages, contain nothing new.

Dennert's (6) patient in question was 38 years old. Extensive syphilitic destructions in the naso-pharyngeal space. In place of the normally visible parts, white cicatricial tissue. Hermetical shutting off of the buccal from the naso-pharyngeal space by the cicatricial union of the soft palate. In the act of deglutition no motion of the soft parts perceptible anywhere in the naso-pharyngeal space. Bilateral impaired hearing and subjective noises. In both membranæ tympanorum, more perceptible in the left, distinct sinking in during the act of deglutition, with subsequent outward movement. These appearances were not influenced by closure of the nose during deglutition. The same observations could be made on a plug of mucus within the incised membrana tympani. Dennert explains the described phenomena by the dilatation of the tube in the act of deglutition, and as ventilation was impossible on account of the organic closure of the pharyngeal mouth of the tube, this dilatation must be followed by a rarefaction of the enclosed air, which in turn moves the yielding parts of the membrana tympani toward the drum cavity by aspiration, thus causing a negative oscillation.

Hensen (7), after a short historical exposition of the present state of our knowledge of the functions of the tensor tympani, publishes a small series of experiments instituted by him in such manner as to lay open the tympanic cavity in a slightly curarized dog and a cat, a pin being inserted into the belly or tendon of the tensor tympani muscle. It was shown that every sound, every tone caused motion of the pin; higher tones were followed by much stronger oscillations of the muscle than lower ones, and with organ-pipe tones of less than 200 vibrations it remained doubtful whether or not any motion at all followed, while the muscle reacted on words pronounced in deep bass voice. If the tone was sustained, the

pin came to rest. Hensen further observed a stronger tremor of the muscle on first striking a tone, and at the beginning of a syllable. Something confirmatory of this view will be found in Blake's communication (these ARCHIVES, vol. vii, p. 457, etc.), according to which a distinct excursion of the membrana tympani was observed by the variation of the atmospheric pressure on pronouncing the so-called explosive sounds, B, T, etc. Hensen himself gives to his paper the character of a preliminary communication, hence we may expect that the author will find time and opportunity to proceed, by means of further experiments, to the solution of the questions raised by himself, and to the settlement of the points still left doubtful in his essay.

Buerkner (8) made the observation, "That the ticking of a watch applied to the bones of the skull, is heard by not a few ear-patients at one time quite loud, at another much more faintly or not at all," the subject of further investigations, and came to the conclusion "that the intensity of sound perception by the bones of the skull, if inconstant, is directly proportionate, at least in affections of the middle ear in general, to the hearing distance by air conduction" [? REV.].

The author illustrates this proposition by the histories of six cases, which contain nothing remarkable and cannot be used in proof of any assertion, inasmuch as, on the one hand, the diagnosis was uncertain in some cases; on the other hand, as the subjective observations of children of ten and twelve years are unreliable, and, finally, as the test of bone conduction, in general, yields rather unavailable results.

Lucae (9) adds to his "Review of the Ear Patients treated at the clinic of the Berlin University," some notes on functional examination, which the Reviewer desires to communicate in this place as belonging to the physiological part of these reports. The process of Lucae's method of examination was this: "That, after testing the acuteness of hearing for whispered speech, after employment of the otoscope, and, wherever possible, even in children, of the catheter in all cases where inflation produced negative results, the perception of tones differing in pitch, was examined with loud tuning-forks, from bass G to c<sup>4</sup> in octave intervals." Koenig's steel rods, and other acoustic appliances which need not here be mentioned, were more rarely employed.

"This caused the surprising observation, that a series of affections which would have been classified, according to the objective



examination and the usual terminology, among 'chronic catarrh of the middle ear,' revealed themselves as marked affections of the inner ear, since the examination discovered a great difference of perception between high and low tones, mostly a surprisingly good perception of the *lower* tones, contrasting with imperfect perception of speech."

Lucae then mentions the examination of a patient with a labyrinth affection, who, though clearly perceiving the low tuning-fork sounds, corresponding to the pitch of the vowel U from bass G to c', yet did not understand the vowel U itself, and concludes that the patient could not hear the higher partial tones necessary to the characteristic u-sound; or, which appears more probable to the author, that the patient did no longer perceive the low sounds as tones, but only as uncertain noises. Inasmuch as not all patients are able to give reliable information as to *what* they hear when examined with acoustical instruments, Lucae arrives at the result "that speech is to be considered as the only reliable hearing test of general value." The Reviewer begs to state that he arrived at this and some other conclusions, based on extensive acoustic examinations, as early as 1874 (comp. ARCHIVES OF OPHTH. AND OTOTOLOGY, vol. iv, p. 67, etc., and p. 267, etc.), which seem to have been overlooked by Mr. Lucae.

Thorner (10) proved by experiments that the telephone may occasionally be employed to advantage for the detection of induced currents too weak to be perceived even by the tongue.